THE

FLORA SYLVATICA

FOR

SOUTHERN INDIA:

BENGAL SECRETARIAT LIBRARY.

CONTAINING QUARTO PLATES OF ALL THE PRINCIPAL TIMBER TREES IN SOUTHERN INDIA AND CEYLON, ACCOMPANIED BY A BOTANICAL MANUAL, WITH DESCRIPTIONS OF EVERY KNOWN TREE AND SHRUB, AND ANALYSIS OF EVERY GENUS NOT FIGURED IN THE PLATES.

BY

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CONSERVATOR OF FORESTS.

Vol. II.

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BENGAL SECRETARIAT
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SPONDIAS MANGIFERA. (Nat. order Anacardiaceæ.)

SPONDIAS. *Linn.*—GEN. CHAR. Flowers polygamous Calyx small, 4 or 5 lobed or divided to the base. Petals 4 or 5, spreading, almost valvate in the bud. Disk orbicular, crenate, stamens twice as many as petals, inserted round the disk. Ovary 3 to 6-celled, with as many short conical connivent styles, ovules solitary in each cell, pendulous. Drupe with a fleshy epicarp, the putamen hard and bony, the cells erect or vertically curved and diverging at the top, the putamen pierced with a foramen corresponding to the apex of each cell. Seeds solitary in each cell pendulous, testa membranous, embryo straight or slightly curved with the seed; cotyledons oblong, radicle superior. Trees, leaves crowded at the ends of the branches, pinnate, flowers small, in terminal or axillary panicles.—Evia, *Comm.* Cytherea, *WA.* Poupartia, *Comm.*

SPONDIAS MANGIFERA. (Pers.) A large tree, trunk straight, bark smooth ash-colored astringent, leaves alternate about the ends of the branches, pinnate with an odd one 12-20 inches long, petiole terete, leaflets 4-5 pair opposite or subopposite ovate to elliptic-oblong rather abruptly acuminate oblique at the base quite entire glabrous prominently veined, 3-6 inches long by 2-2½ broad, panicles terminal large diffuse, flowers numerous small white often barren, disk large fleshy crenate, anthers alternately shorter incurved about ½ as long as the petals, styles 5-6, ovary 5-6 celled, drupe oval or nearly round yellow when ripe about 1¼ inch across. *Roxb. Fl. Ind.* ii. 451. Evia amara, *Commers.* Ambalam, *Rheede Mal.* 1. *p.* 89. t. 50.

This is a common tree in jungles throughout this Presidency, and in Ceylon it ascends the mountains to about 3500 *feet; it is known to Europeans as the Hog plum, and is called àmrà in Hindustani, Kàt màa in Tamil, and Aravi màmadi in Teligoo (names signifying wild mango); its fruit is eaten raw when ripe, and unripe it is pickled and preserved, and eaten in curries; the wood is soft and of little or no value, and a gum much like Gum Arabic exudes from the trunk; the leaves are agreeably acid. In the Anamallays it is called Puli ille by the Kaders.*

SECRETARIAT LIBRARY

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PRICES-CURRENT (*RETAIL*) OF FOOD-GRAINS AND SALT

IN THE

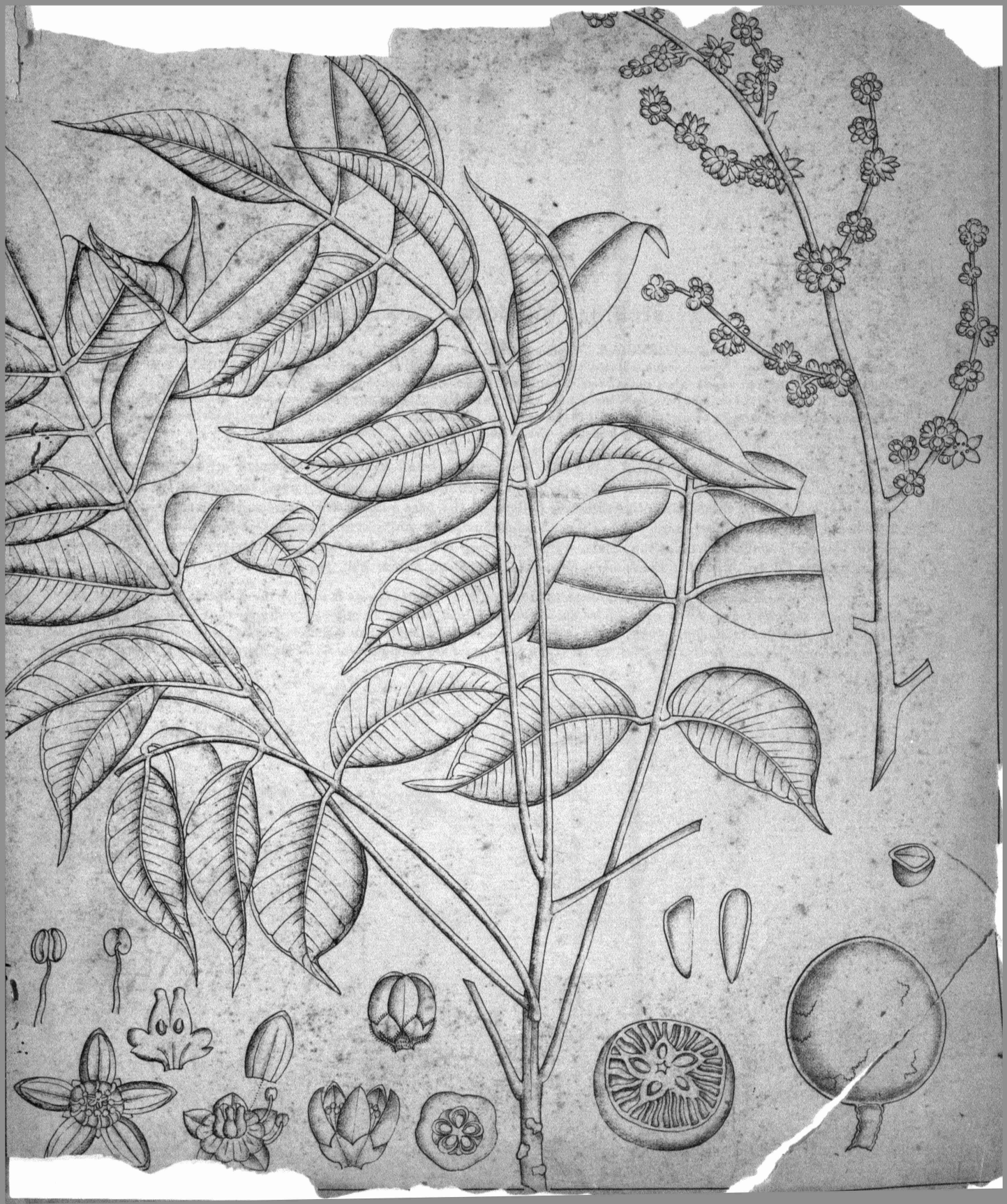
HEAD-QUARTERS STATION BAZARS OF THE DISTRICTS OF BENGAL

DURING THE FORTNIGHT ENDING THE 15TH JANUARY 1905.

PRICES-CURRENT (retail) of Food-grains and Salt in the Head-quarters

Number.	Districts.	Quantities per rupee in: Wheat. Present return.	Wheat. Next preceding return.	Wheat. Corresponding return of last year.	Barley. Present return.	Barley. Next preceding return.	Barley. Corresponding return of last year.	Rice, common. Present return.	Rice, common. Next preceding return.	Rice, common. Corresponding return of last year.	Jowar or Cholum (*Sorghum Vulgare*). Present return.	Jowar or Cholum. Next preceding return.	Jowar or Cholum. Corresponding return of last year.
	BENGAL.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.	S. Ch.
Burdwan Division.													
1	Burdwan ...	13 8	16 0	13 0	...	...	...	New 15 0	13 8	13 0	...	...	...
2	Birbhum ...	12 12	12 0	12 0	...	...	...	15 0	15 0	13 8	...	...	...
3	Bankura ...	13 8	13 8	11 0	...	...	...	15 0	15 0	15 0	...	...	...
4	Midnapore ...	12 0	12 0	11 8	...	...	...	15 8	15 8	16 0	...	...	...
5	Hooghly ...	11 0	11 0	12 10	...	...	...	10 0	11 0	10 0	...	...	...
6	Howrah ...	12 0	12 0	12 6	...	...	19 0	13 0	12 0	11 0	...	...	...
Presidency Division.													
7	24-Parganas ...	...	...	...	...	...	...	12 0	12 0	12 0	...	...	...
8	Calcutta ...	12 4	12 4	12 4	16 0	16 0	14 8	9 10	9 10	9 6	...	...	16 0
9	Nadia ...	14 9	13 12	12 4	...	...	...	13 0	13 0	11 6	...	...	...
10	Mursbidabad ...	15 0	16 0	13 8	29 0	23 0	20 0	15 0	14 0	13 0	...	...	...
11	Jessore ...	10 0	10 0	11 4	11 8	11 8	10 4	14 0	14 8	15 0	...	...	...
12	Khulna ...	...	...	...	...	...	...	14 0	14 0	16 0	...	...	...
Rajshahi Division.													
13	Rajshahi ...	18 0	18 0	15 12	26 4	26 4	20 4	15 0	15 0	Old 12 12 / New 14 4	...	—	...
14	Dinajpur ...	15 0	16 0	13 0	...	...	...	15 9	15 9	15 8	...	...	...
15	Jalpaiguri ...	12 0	12 0	10 8	...	...	...	12 8	12 8	13 0	...	...	...
16	Darjeeling ...	...	...	...	...	...	...	12 0	12 0	12 0	...	...	...
17	Rangpur ...	13 4	13 4	11 4	...	...	...	16 0	New 15 0	14 10	...	...	—
18	Bogra ...	14 1	14 1	14 1	...	...	...	16 8	16 0	17 4	...	...	...
19	Pabna ...	17 12	18 0	16 8	26 9	26 0	26 0	14 4	15 0	17 4	...	...	...
Dacca Division.													
20	Dacca ...	16 0	16 0	16 0	25 0	25 0	16 0	15 0	5 0	16 0	...	...	...
21	Mymensingh ...	12 8	12 8	11 4	11 6	11 6	11 0	16 13	6 0	16 0	...	...	...
22	Faridpur ...	20 0	20 0	16 0	30 0	32 0	22 0	14 0	13 4	15 8	...	...	...
23	Backergunge ...	...	...	...	...	...	...	Old 15 0 / New 15 0	Old 14 4 / New 16 0	Old 12 0 / New 6 0	...	...	...

A. In the subdivisions the retail prices of salt per rupee are—Kalna 13 seers; Katwa 13¾ seers; Raniganj 13¼ seers.
B. At Rampur Hât the retail price of salt is 13 seers per rupee.
C. At Vishnupur the retail price of salt is 14 seers per rupee.
D. In the subdivisions the retail prices of salt per rupee are—Contai 12 seers; Tamluk 11 seers; Ghatal 13¼ seers.
E. In the subdivisions the retail prices of salt per rupee are—Serampore 13 seers 4 chitaks; Arambagh 12 seers 13 chitaks.
F. At Ulubaria the retail price of salt is 13 seers 14½ chitaks per rupee.
In the marts in the interior of the district the retail prices of salt per rupee are—Chetla 13 [illegible] seers; Barasat 13 seers 5 chitaks; Baduria 14 seers 8 chitaks; Mograhat return not received; Barrackpore 1[illegible] seers.
[illegible] the subdivisions the retail prices of salt per rupee are—Kushtia 13¼ seers; [illegible] seers (panga); [illegible] Ranaghat 14½ seers.
[illegible] prices of salt per r[illegible] 13[illegible] seers; Kan[illegible] 10.5 seers.
[illegible] Ma[illegible]



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ELLIPANTHUS UNIFOLIATUS. (Nat. order Connaraceæ.)

ELLIPANTHUS. *Hook fil.*—GEN. CHAR. Flowers polygamous, calyx 5 parted not increasing in size after flowering suberect valvate, petals 5 longer than the calyx oblongo-lanceolate pubescent imbricate, stamens 5 fertile alternate with as many shorter sterile ones, filaments short subulate connate at the base into a hirsute tube, carpel 1 ovoid strigose attenuated into a short style, stigma lobulate; capsule stipitate volutinous, glabrous within, seed arillate at the base, exalbuminous. Trees or shrubs, leaves short petioled 1 foliate, oblong or lanceolate glabrous or slightly tomentose beneath, racemes short axillary tomentose, flowers small.

ELLIPANTHUS UNIFOLIATUS. (Thw.) A middling sized tree 20-30 feet high, branches and petioles blackish, young parts fusco-pilose, leaves 1-foliate glabrous elliptic or ovate abruptly acuminate reticulate, $1\frac{3}{4}$-$3\frac{1}{2}$ inches long by 1-$1\frac{3}{4}$ inches broad, petiolule tumid 1 line long rugulose articulate with the petiole which is 3 lines long, panicles small axillary 1-2 or 3 together racemiform 4-7 flowered, fusco-hirsute, bracteoles linear deciduous, flowers pale green about 3 lines in expansion, short pedicelled, calyx divisions acute, petals externally pilose twice as long as the calyx, stamens 5 joined into a tube alternate with 5 minute teeth-like staminodes, ovary strigose attenuated into a short style, stigma dilated, fruit fulvo-tomentose arcuato-falcate acute attenuated at the base into a stipe.—Connarus unifoliatus, *Thw. En. Pl. Zey. p.* 80. Ellipanthus, *Benth. and Hook. Gen. Pl.* 1. *p.* 434.

Ceylon in the central provinces, 3-4000 *feet, rather a rare tree.*

Analysis.

1. A flower bud.
2. A flower.
3. A fertile flower, petals removed.
4. Stamen tube showing the 5 fertile stamens alternate with 5 minute staminodia.
5. Anthers, front and back view.
6. Ovary.
7. The same cut vertically.
8. The same cut transversely.
9. A sterile flower.

10 to 14. Fruit and seed.

(Figures 9—14 communicated by Dr. Thwaites.)

Govindo, del.

Murphy, Lith.

Ellipanthus unifoliatus (Hew.)

COCHLOSPERMUM GOSSYPIUM. (Nat. order Ternstræmiaceæ.)

This tree is fully described in the Manual, vide page xiv.

Govindu del.

Dumphey lith.

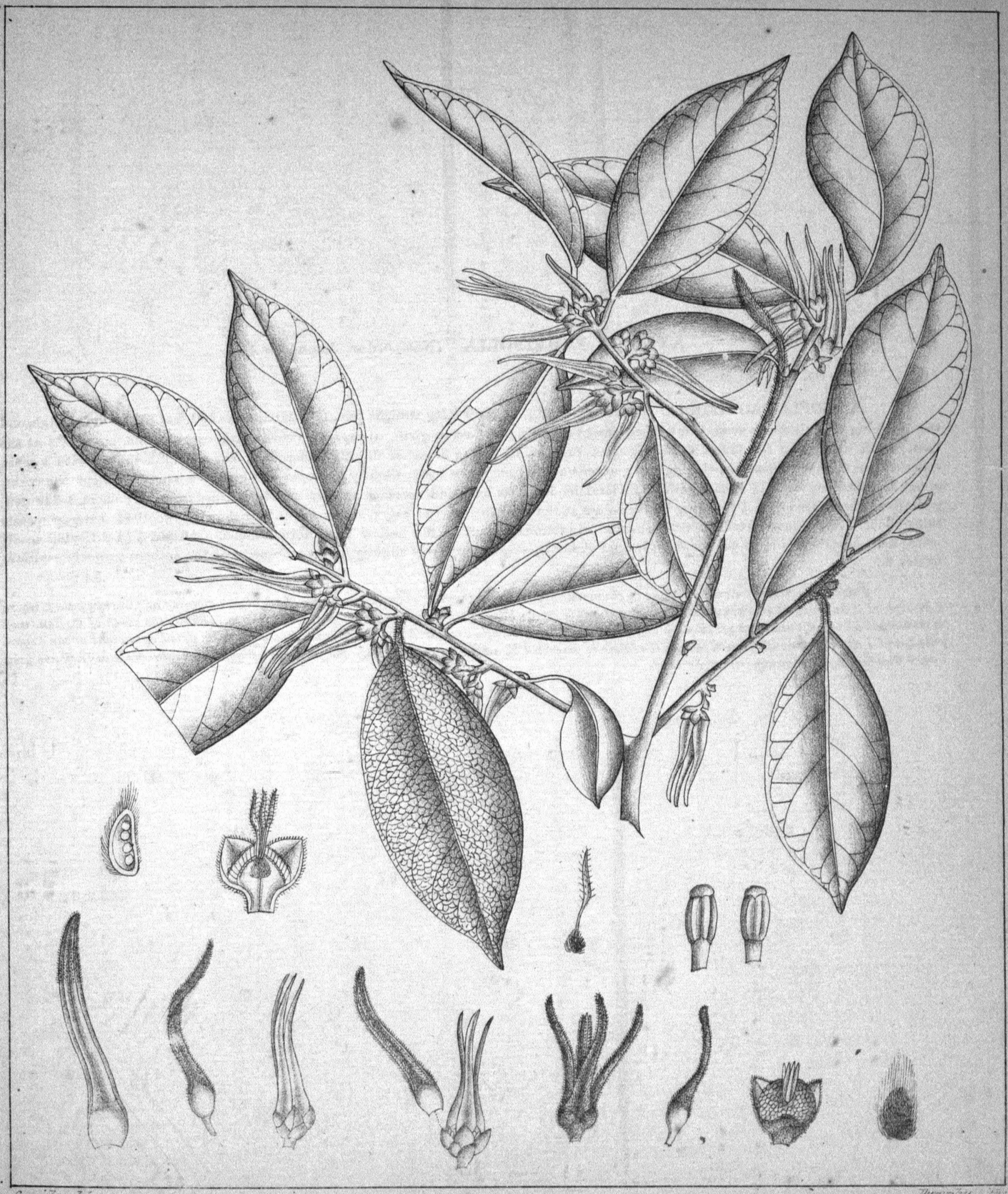
Cochlospermum Gossypium (D.C.)

XYLOPIA PARVIFOLIA. (Nat. order Anonaceæ.)

For Gen. Char. see Manual, p. ix.

XYLOPIA PARVIFOLIA. (Hook. fil. et T.) A very lofty straight tree, 60—80 or even 100 feet to the first bough, and then forming a small dense head, trunk of no great thickness, 4-6 feet in girth, always furnished with considerable buttresses at the base, which extend up the trunk 6-10 feet from the ground, young branches slightly puberulous, leaves elliptic oblong with a short acumination, slightly coriaceous shining and glabrous above except the costa, slightly glaucous and glabrous beneath except the costa, about 3 inches long by 1-1¼ broad, petioles puberulous 3-4 lines long, inflorescence axillary pubescent, peduncle very short 3-flowered, pedicels scarcely more than 1 line long bibracteolate at the apex below the calyx, calyx small cup-shaped 3-toothed, exterior petals thick about 9 lines long, interior a little shorter triquetrous except at the hollow base, torus conical, ovaries 3-4 (5-6 Ceylon specimens) densely strigose hid in the torus, style long glabrous, stigma very large slightly hairy, connective of the anthers truncate capitate, ovules 4.

This lofty straight tree is abundant in the moist forests about the foot of the Travancore ghâts in the vicinity of Colatoorpalay, where I discovered it in flower this August; it is the first time the genus has been observed on the continent; it also inhabits the south of Ceylon, and is mentioned in the Manual at page ix. *as a Ceylon tree. I have carefully compared the Travancore specimens with dried specimens of the Ceylon plant, and I can detect no difference, though the latter is described as a small tree or shrub. Dr. Thwaites says that the flowers and bark are used by the Cinghalese for chewing with their betel.*



Covedillo, del: Dieneveldt

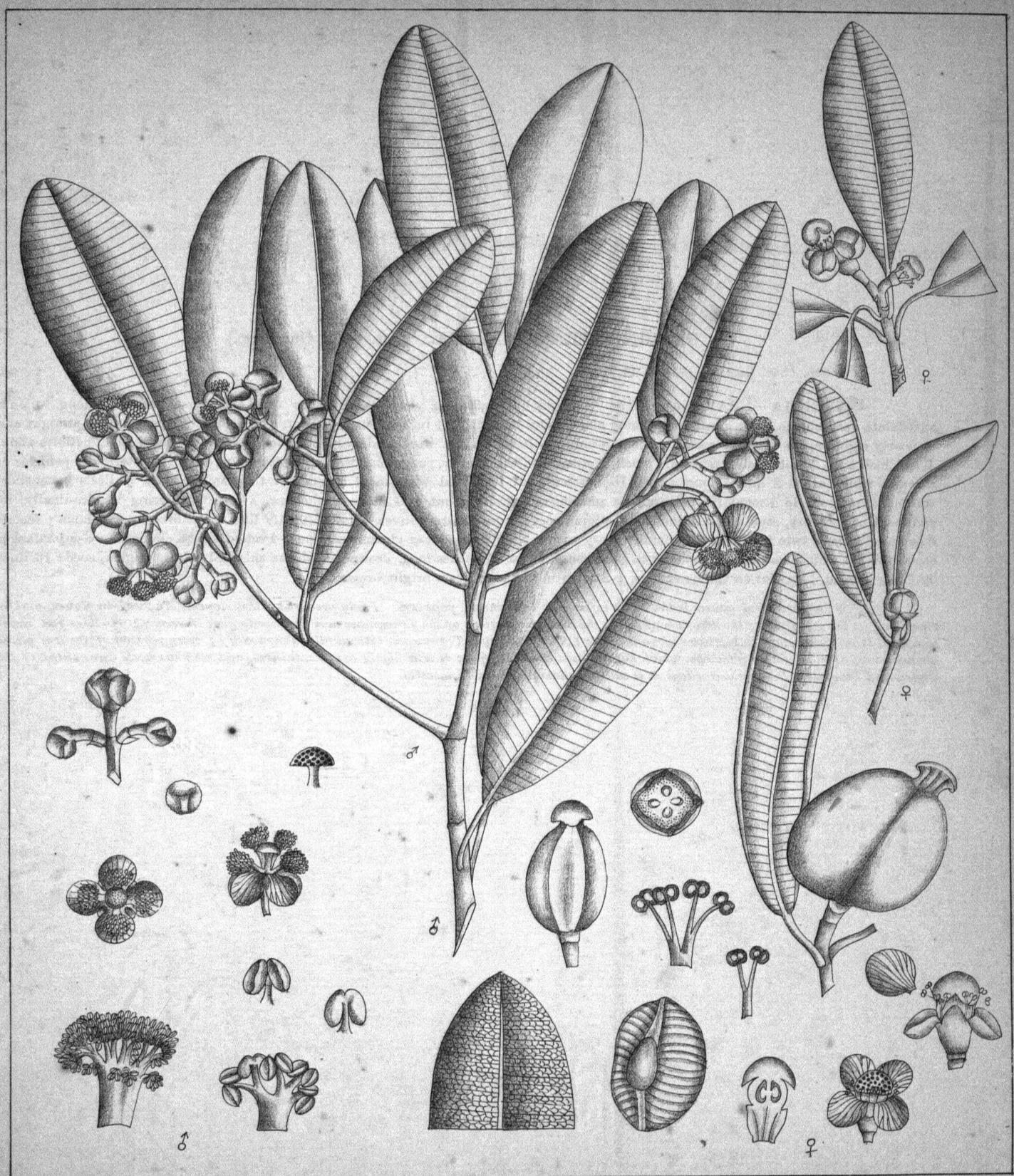
Hylopia parviflora, Hook fil et T.

GARCINIA TRAVANCORICA. (Nat. order Guttiferæ.)

For Gen. Char. see letter press to Pl. lxxxv.

GARCINIA TRAVANCORICA. (Bedd.) A middling sized tree, leaves very coriaceous narrow oblong to subspathulate very obtuse, dark green and shining above paler beneath, 3-4 inches long by about 1 inch broad, primary veins straight and at nearly right angles with the costa, veinlets forming a beautiful net work and very conspicuous on the under side, petioles about ½ to 1 inch long, 2 outer calyx segments much smaller than the 2 inner, petals rounded; male flowers on very short terminal panicles or racemes which are 1-2 inches long and 5-15 flowered and furnished with small bractes at the ramifications, pedicels very short thickened, stamens in 4 many-fid polyandrous phalanges, anthers about 100 in each phalanx, 2-celled dehiscing longitudinally, no rudiment of an ovary, style thick 2 lines long, stigma very large peltate convex above, exactly like a mushroom, glutinous; female flowers solitary or twin in the terminal axils, ovary with a very large convex glutinous stigma, 4 celled, effete stamens in 6-8 phalanges each with 2-4 thin filaments, fruit oblong to subglobose, 1¼ to 1¾ inches long, crowned with the enlarged peltate stigma, seeds 15 lines by 7 lines broad, long, flat on the inner face, 1-2 come to maturity, testa bright brown.

This very beautiful species is the No. 2 referred to in Manual, page xxi. *I only procured it last month (August) in flower, and in ripe fruit at the same time; the tree is confined to the southern portions of the Travancore and Tinnevelly ghat forests (*3000-4500 *feet elevation), but is most abundant in localities where it grows (Muti-kuli vayal Travancore, Calcad hills Tinnevelly); every portion of the tree yields abundance of a bright yellow gamboge, which has not been examined yet; it is a highly ornamental tree, and seed has been transmitted to the Ceylon and Bangalore Botanical Gardens, it is called Malam pongu in Tinnevelly.*



Gourdo del.

Dumphy. Lith.

Garcinia Travancorica, (Beddk.)

ELÆOCARPUS VENUSTUS. (Nat. order Tiliaceæ.)

For Gen. Char. see letter press to Pl. cxi.

ELÆOCARPUS VENUSTUS. (Bedd.) A large tree, glabrous in all its parts except the flowers, leaves elliptic to oblong or sometimes obovate, slightly acute or quite rounded at the apex attenuated at the base, serratures shallow distant and inconspicuous, coriaceous, 3-4½ inches long by 1½-2 broad, furnished with very large glands in the axils of the primary veins beneath, which often terminate in a pointed or bifid process raised above the lamina of the leaf, the glands form prominent convex marks on the upper side of the leaf, petioles 6-8 lines long, racemes axillary lax 4-8 flowered as long or a little longer than the leaves, pedicels distant 12-16 lines long with a minute deciduous bracteole at the base of each, flowers 12-16 lines in expansion pure white and very fragrant, calyx glabrous on the outside, pubescent within, divisions thick and coriaceous, petals a little longer than the calyx 3 cleft with each division 5-6 fingered, rather densely silky on the outside, nearly glabrous within except the hairy raised process at the base, the linear anthers and filaments hairy, the upper valve with a short point, ovary glabrous 2 celled, cells with 6 ovules in 2 rows, style subulate very slightly hairy, drupe not seen.

A fine large tree only observed in the Muti kuli vayal, South Travancore, 4500 feet elevation, in flower in August; it is truly beautiful when covered with its snow white large flowers, which it produces in great abundance; it has only just been discovered, and should be added to the Manual at page xxxviii.

Govinda, del:

Dunsday Lith:

Elæocarpus venustus (Bedd:)

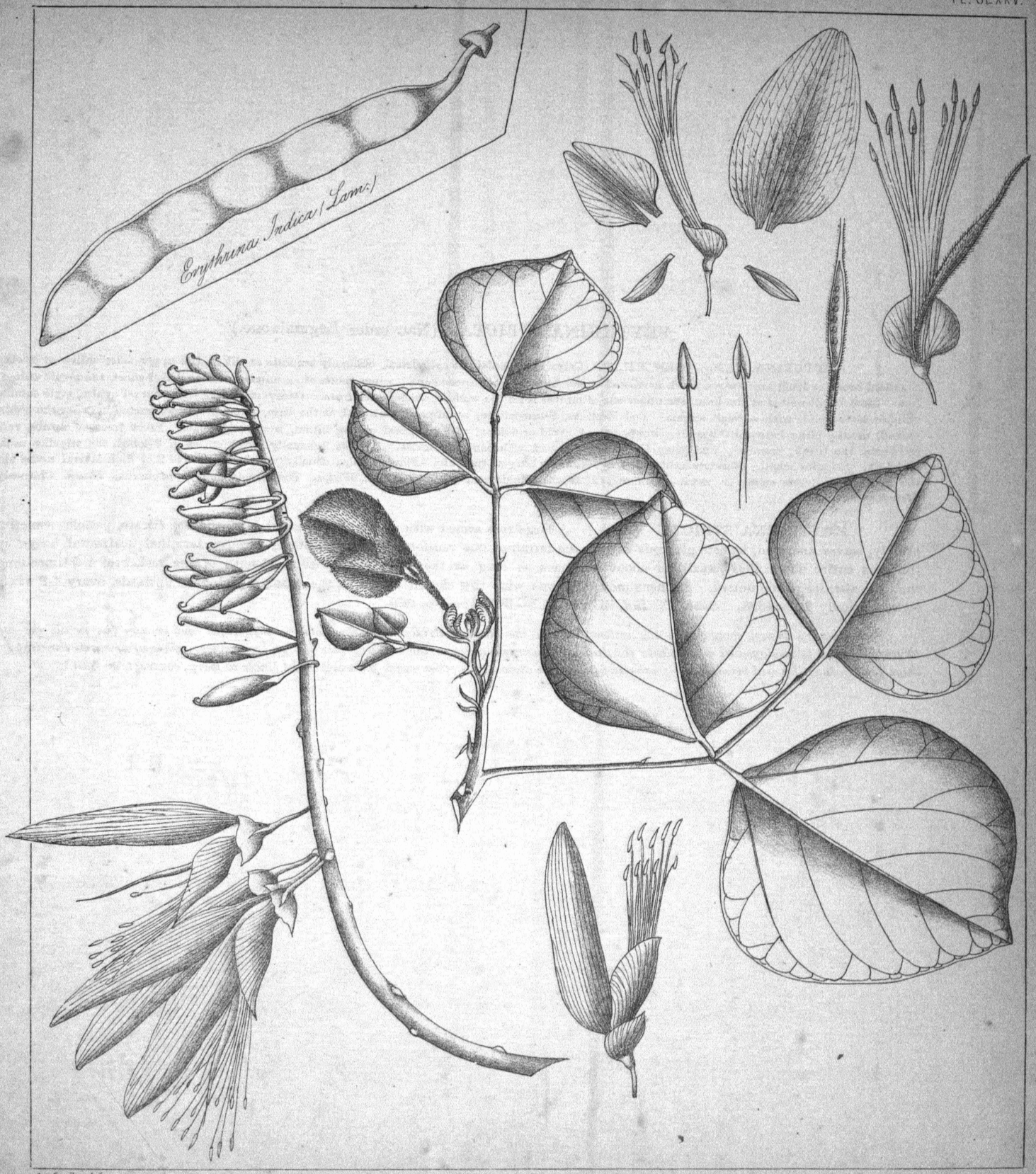
3914

ERYTHRINA STRICTA. (Nat. order Leguminosæ.)

ERYTHRINA. *Linn.*—GEN. CHAR. Calyx campanulate or cylindrical, obliquely truncate or slit on the upper side, entire or toothed. Standard broad or long, erect or recurved, narrowed at the base, without appendages; wings short, often minute or none; keel short, the petals united or free. Stamens all united at the base, the upper one often free from the middle, anthers reniform. Ovary stipitate, with several ovules, style subulate, oblique at the end, with a small stigma. Pod stipitate, linear-falcate, acuminate, narrowed at the base, more or less contracted between the seeds, 2 valved, usually pithy between the seeds. Seeds distant, ovoid or oblong, with a lateral oblong hilum, not strophiolate. Erect trees or shrubs, rarely tall herbs, the trunk, branches, and often the petioles armed with conical prickles Leaflets 3, usually broad, entire or 3-lobed, the stipellæ usually gland-lik. Stipules small. Racemes axillary, or, if terminal, leafy at the base. Flowers large, usually red, in clusters of 2 or 3 on lateral nodes along the peduncle. Bracts small or none.—Micropteryx, Duchassaingia and Macrocymbium, *Walps*. Stenotropis and Hypaphorus, *Hassk*. Chirocalyx, *Meissn*.

ERYTHRINA STRICTA. (Roxb.) A large tree armed with numerous white prickles, stipules falcate, petioles sometimes prickly, leaves unarmed, leaflets glabrous entire, the terminal one reniform-cordate pointed; racemes terminal horizontal, calyx spathaceous entire acute short, vexillum about 10 times as long as the calyx and twice the length of the keel, keel 4-5 times longer than the alæ, its petals united. Stamens monadelphous with the sheath entire at the base, diadelphous upwards, ovary 4-8 ovuled, legume usually 2-3 seeded. *Roxb. Fl. Ind.* iii. *p.* 251;—*WA. Prod. p.* 260.

This tree is very common on the western side of the Madras Presidency; the wood is soft, light and spongy (as in all the other Erythrinas); it is employed as a substitute for deal, and is much in use in the manufacture of toys, trunks, &c. and is afterwards varnished, its large pores admitting and retaining the varnish better than almost any other wood, the wood is not liable to warp, contract, or split.



Govindo del. Dunphy, Lith.

Erythrina stricta (Roxb.)

BUTEA FRONDOSA (Nat. order Leguminosæ.)

BUTEA. *Roxb.*—GEN. CHAR. Calyx campanulate bilabiate, upper lip almost entire, lower 3-fid, vexillum ovate acute recurved inappendiculate, alæ falcate adhering to the keel, keel much incurved acute equaling the vexillum. Stamens diadelphous 9 and 1, the vexillum-one free, anthers uniform, ovary sessile or shortly stipitate 2 ovuled, style elongate incurved, stigma small glandular, legume subsessile or stalked oblong or broadly linear 2 valved and 1 seeded at the apex only, below flat compressed rather thin, indehiscent. Trees or lofty climbers, leaves pinnately 3 foliate, stipules small caducous, flowers large orange or flame colored, fascicled in racemes or panicles.

BUTEA FRONDOSA. (Roxb.) A middling sized tree, trunk generally crooked covered with ash-colored spongy thick scabrous bark, the middle stratum of which contains a red juice, young shoots downy, leaves alternate pinnately 3-foliate 8-16 inches long, leaflets emarginate or rounded at the apex, coriaceous above shining and pretty smooth below slightly hoary, the 2 lateral ones obliquely oval, 4-6 inches long 3-4½ broad, the terminal one obovate and much larger than the others. Stipules small recurved downy, stipels subulate, racemes simple lax terminal axillary and from nodes over the naked branchlets, pedicels about twice as long as the calyx, calyx segments short slightly acute several times shorter than the tube, bractes lanceolate caducous, 1 below each pedicel and 2 below the calyx, corol densely pubescent 4 5 times larger than the calyx, of an orange red mixed with silvery down, vexillum ovate acute, legume as in the generic character about 6 inches long downy. *Roxb. Fl. Ind.* iii. *p.* 244.

This tree is common throughout the dry jungles in this Presidency and in Bengal, Bombay and Ceylon ; it is a very beautiful sight when in full flower in March and April ; it is called Palàs in Hindostanee, and gave its name to the field of Plassey as it was covered with this tree, in Teligu it is called Modugu, Thoras in Canarese, and in Ceylon Gass-kaala. The wood somewhat resembles Teak in appearance, and is used for gun-powder charcoal, also for building purposes and well curbs ; a red colored astringent gum exudes from wounds made in the bark and is officinal, and the flowers yield a dye , ropes are made from the fresh fibre of the roots.

Govindoo, del: Murphy. Lith:

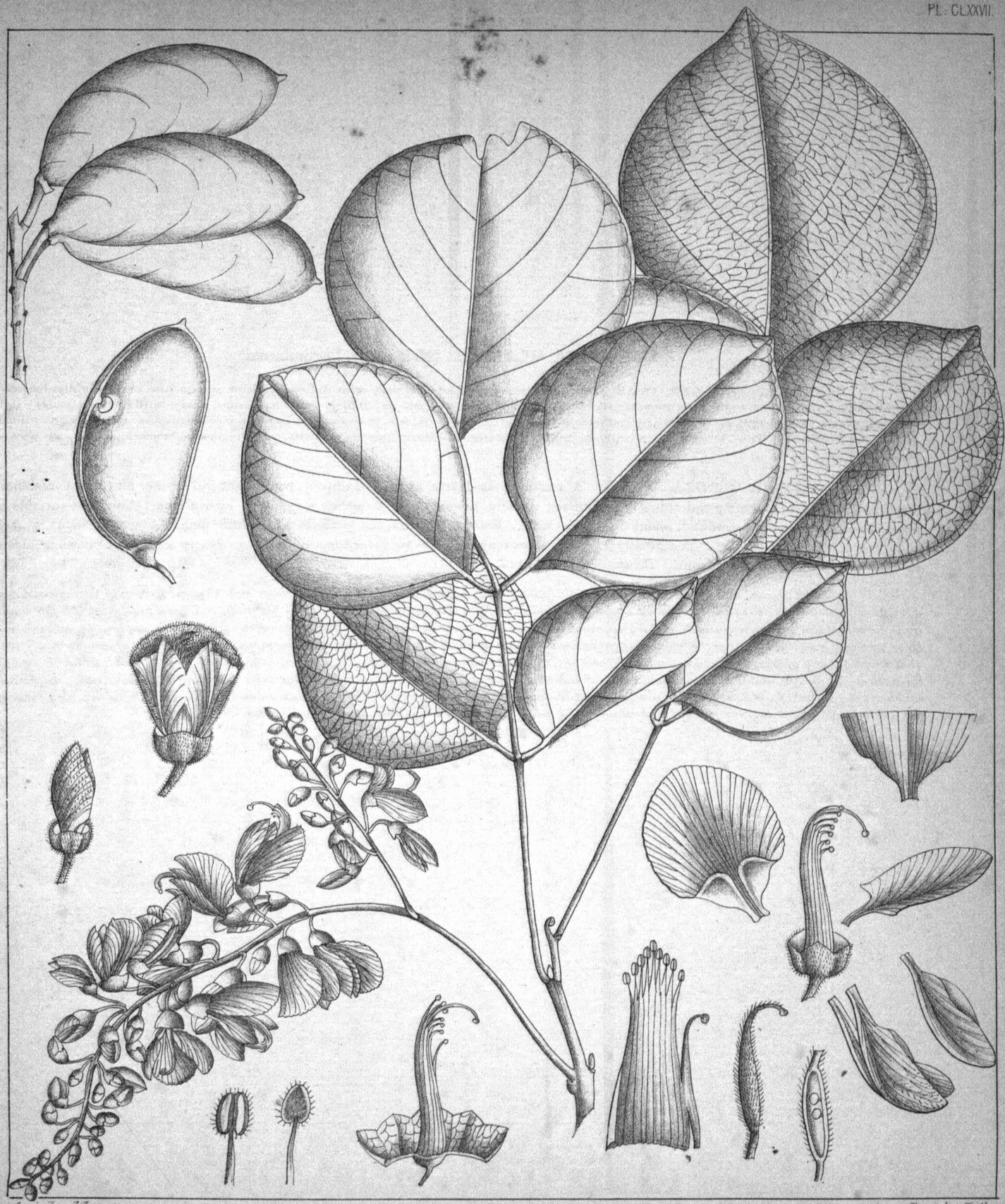
Butea frondosa. (Roxb:)

PONGAMIA GLABRA. (Nat. order Leguminosæ.)

PONGAMIA. *Vent.*—GEN. CHAR. Calyx truncate. Standard orbicular, with inflexed auricles at the base; keel slightly incurved, obtuse. Upper stamen free at the base, connate with the others in a tube in the middle; anthers uniform. Ovary nearly sessile, with 2 ovules; style incurved, stigma small, terminal. Pod broadly and obliquely oblong or slightly falcate, thick but flat, 1-seeded, indehiscent, the sutures obtuse, without wings. Seed reniform. Tree, leaves pinnate, without stipellæ. Flowers in axillary racemes. Bracts very deciduous; bracteoles minute or none.—Galedupa, *Lam.*

PONGAMIA GLABRA. (Vent.) A middling sized tree, glabrous except a very slight pubescence on the inflorescence. Leaflets 5 or 7, ovate, shortly and obtusely acuminate, usually broad, about 3 inches long, on a rather long petiole, but variable in size. Racemes sometimes panicled, about 3-5 inches long. Flowers in pairs, the pedicels 2 to 4 lines long. Standard about ½ inch diameter, lower petals shorter. Pod usually 1½ to 2 inches long, and about 1 inch broad, sessile or nearly so, often somewhat falcate or with a very short incurved point. *Benth. Syn. Dalb.* 117.

This tree is most abundant throughout South India in the plains, also in Bengal, Bombay and Ceylon, generally on the banks of streams or near water; it is called Pongà in Tamil; Kanigà in Teligu, Karunj in Bombay, Magool Karanda in Ceylon; the wood is light, tough and fibrous, coarse and even grained, of light yellowish brown color, not easily worked nor giving a smooth surface; it is improved in strength and color by being seasoned in water; a cubic foot unseasoned weighs 48 to 55 lbs., and 40 lbs. when seasoned, and its specific gravity is ·640; it is used for a variety of purposes, and the solid Wheels of the wodar carts are often made of it. An oil is expressed from the seed, which is used by the natives for lamps, and it is an excellent cure for itch and mange; the tree generally sheds its leaves at the end of the cold season; its flowers which are a mixture of white and purple are produced in the hot season, and its seed ripens towards the end of the year. Cattle are very fond of the leaves, boughs stuck into the ground root readily, and grass and almost everything else grow well under its shade.



Govindoo, del: Dumphy, Lith:

Pongamia glabra. (Vent.)

POINCIANA ELATA. (Nat. order Leguminosæ.)

POINCIANA. *Linn.*—GEN. CHAR. Sepals 5 equal or subequal united below into a very short cup-shaped somewhat persistent base, petals 5 orbicular imbricate subequal or the upper one shaped differently from the others, stamens 10 free much longer than the petals, slightly villous at the base, anthers, uniform, cells dehiscing longitudinally, ovary sessile free many-ovuled, style filiform or abbreviated, apex slightly clavate, stigma truncate, legume elongate flatly compressed wingless 2 valved several seeded intercepted internally between the seeds, seed transverse oblong albuminous, hilum small, testa hard. Cotyledons rather thick, radicle short straight exserted. Unarmed trees, leaves bipinnate, leaflets numerous small, stipules inconspicuous, stipels none, flowers showy corymbosely racemed at the apex of the branches.

POINCIANA ELATA. (L.) A middling sized very showy tree, 20-30 feet, bark pretty smooth ash-colored, branches numerous spreading much, leaves alternate bipinnate about 6 inches long, pinnæ 2-8 pair opposite, leaflets 10-20 pair sessile opposite linear glabrous about 4 lines long by 1 broad, petiole grooved on the upper side, racemes terminal corymbiform few flowered, flowers large showy inodorous yellowish, bracts small 1 flowered caducous, calyx villous on the outside, petals 5 of which the upper one is a little smaller and deeper colored, all nearly round and much curled at the margin, filaments ascending afterwards recurved, twice as long as the petals, thick and villous at the base, anthers versatile. *Roxb. Fl. Ind.* ii. *p.* 355.

A very beautiful tree, rather rare in our jungles, though met with in the forests of both the eastern and western coasts; most abundant in a planted state in avenues, topes, gardens, native cemeteries, &c., the wood is yellow, tolerably close and even grained, easily worked and gives a smooth surface, warps slightly but never cracks; a cubic foot unseasoned weighs 54-58 *lbs., and when seasoned* 45 *lbs., the specific gravity is* ·720, *it is well suited for cabinet work.*

Govindoo. del: Dumphy. Lith:

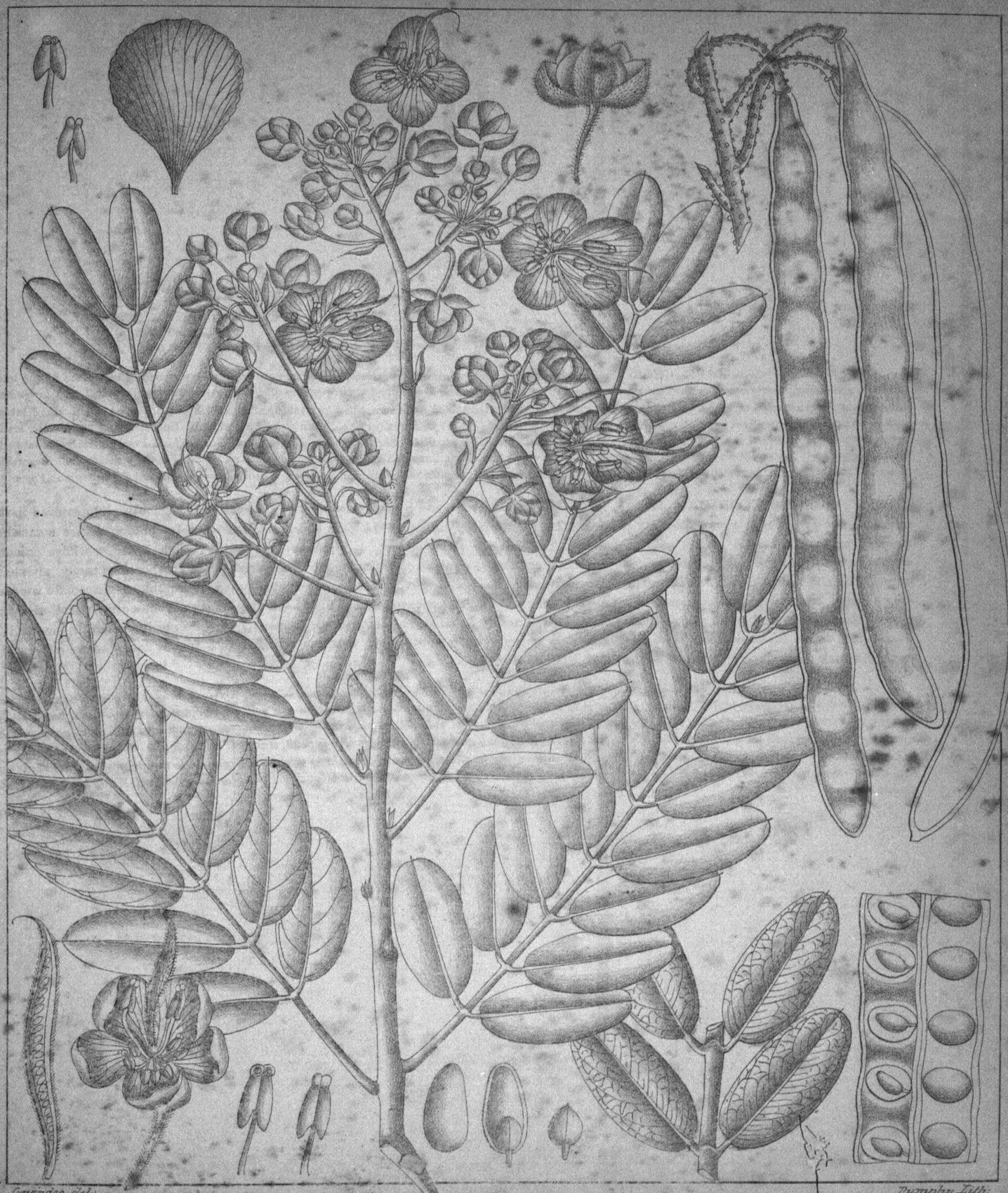
Poinciana elata (Linn)

CASSIA FLORIDA. (Nat. order Leguminosæ.)

CASSIA. *Linn.*—GEN CHAR. Sepals 5, somewhat unequal, much imbricate, the outer ones the smallest, scarcely connected at the base. Petals 5, spreading, nearly equal or the lower outer ones rather larger. Stamens usually 10, free, either all nearly equal and perfect or 2 or 3 lower ones larger or on longer filaments, and 3 or 4 upper ones reduced to small staminodia; anthers when perfect opening at the end in pores or in short lateral slits. Ovary with several ovules, incurved, tapering into a short style. Pod cylindrical or flat, indehiscent or 2 valved. Seeds oblong or obovate, transverse, with fleshy albumen, cotyledons flat or rarely folded, usually cordate; radicle short, straight. Trees, shrubs or herbs, leaves abruptly pinnate, the leaflets opposite. Flowers yellow or very rarely reddish-purple or white, in axillary or terminal racemes or solitary. Bracts usually deciduous. Bracteoles none.—Cathartocarpus, *Don.* Senna, *Gært.* Chamæfistula, Chamæsenna, Chamæcrista and Fistula, *DC.* Absus, Prososperma and Psilorhegma, *Vog.*

CASSIA FLORIDA. (Vahl.) A middling sized tree, trunk pretty straight and covered with smooth olive colored bark, branches few spreading, leaves alternate pinnate 6-12 inches long, leaflets 4-14 pair short petioled opposite oblong entire somewhat emarginate with a bristle point, smooth shining, the exterior pairs largest, 1-3 inches long by ½-1 inch broad, petioles smooth channelled without glands, stipules minute subulate caducous, panicles terminal very large erect ovate composed of many alternate corymbiform racemes, peduncles pubescent, flowers numerous large bright yellow, pedicels subtended by an oblong-lanceolate concave long pointed bracteole, calyx segments unequal pale yellow roundish concave reflexed about ⅓rd the length of the corol, corol with the upper petal small long clawed and obcordate, the other 4 nearly equal and almost round, stamens 7 fertile differing much in size and 3 barren and small, legumes linear thin, swelled a little at the seeds smooth, both margins rounded 6-8 inches long, seeds many thin oval of a dark brown color. *WA. Prod. p.* 288. Senna Sumatrana, *Roxb. Fl. Ind.* ii. *p.* 347.

This tree is common in a wild state in the jungles quite at the south of this Presidency and in Ceylon, and it is common everywhere as a planted tree in avenues, topes, gardens, &c., it is of rapid growth and ornamental, the wood is of a yellowish brown color, sometimes beautifully marked with irregular black streaks, close grained, hard and durable, but not stiff, works kindly with a smooth surface and stands a good polish, a cubic foot unseasoned weighs 68-70 *lbs., and when seasoned* 58 *lbs., and its specific gravity is* ·928, *it is well adapted for furniture but seems to be little known or used in this Presidency, in Birmah it is used for mallets, helves and walking sticks, in Ceylon it is the principal fuel used for the Locomotives, and it is said to have as good caloric powers as any wood known in the island. In Ceylon it is called Wau, and in Tamil Manje konne.*



Corrado. del. Dumphey lith.

Cassia floridana (Vahl)

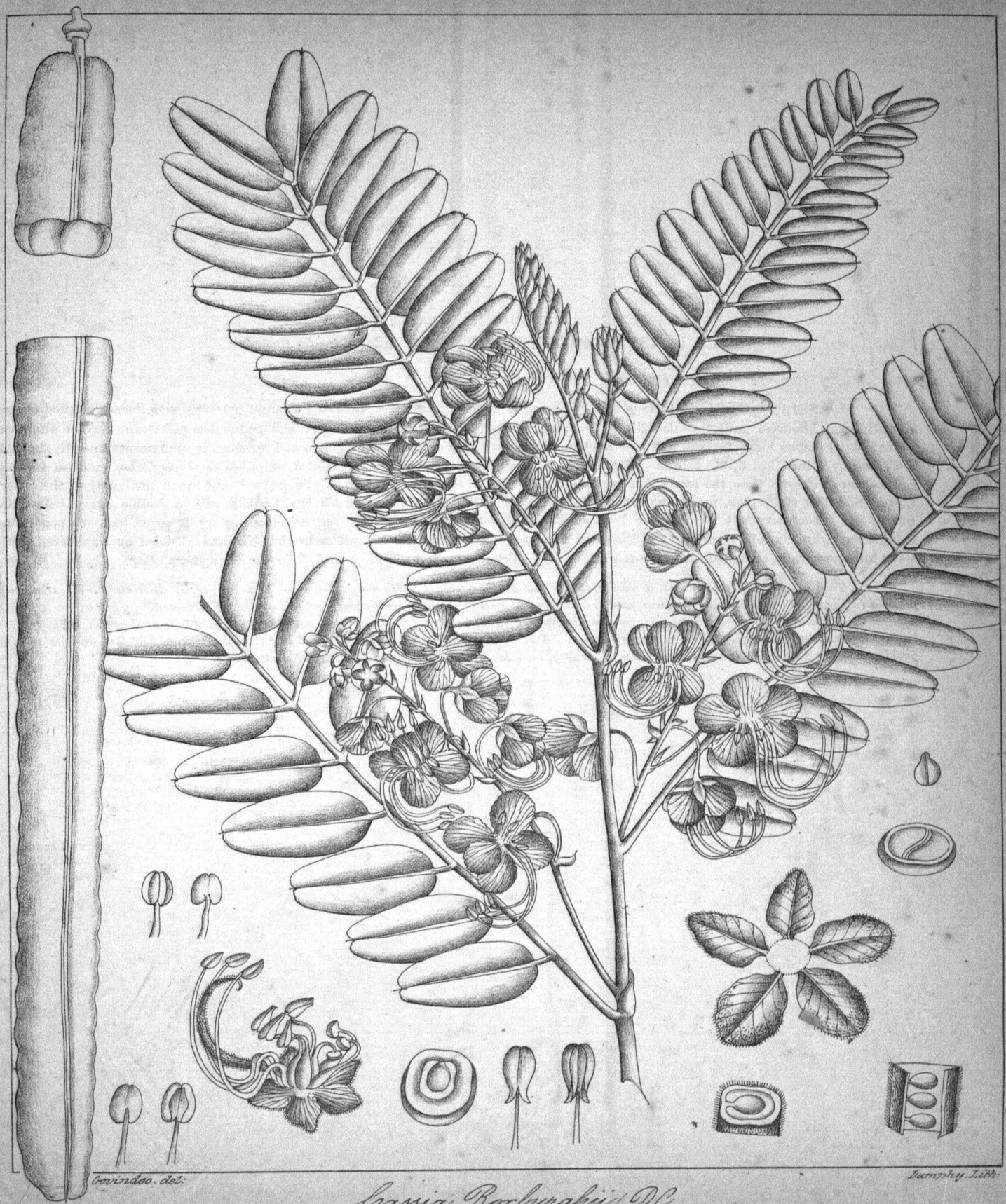
BENGAL SECRETARIAT
LIBRARY.

CASSIA ROXBURGHII. (Nat. order Leguminosæ.)

For Gen. Char. see letter press to Pl. clxxix.

CASSIA ROXBURGHII. (DC.) A small or middling sized tree, tolerably straight, covered with deeply cracked brown colored bark, branches numerous beautifully drooping, young shoots with the petioles and peduncles pubescent, leaves alternate pinnate 6-10 inches long, leaflets 10-20 pairs oblong unequal sided obtuse or emarginate and mucronate, pubescent beneath, about 1 inch long by ½ inch broad, the margins colored and slightly thickened, petioles channelled, stipules semi-saggitate, racemes axillary solitary much shorter than the leaves, bractes 3 lanceolate the 2 inner on the base of the pedicel and much smaller than the other, flowers middling sized pink, petals nearly equal, stamens all fertile, the 3 lower much the largest with a double curve below the middle and the anthers with 2 clefts, the 7 upper ones short incumbent with the anthers opening by 2 pores, legumes pendulous indehiscent cylindric 8-12 inches long 6-8 lines in diameter, dark brown torose and somewhat ligneous, divided by transverse partitions into many cells, seeds lodged in a soft white spongy substance. *WA. Prod. p.* 286. Cassia emarginata, *Roxb. Fl. Ind.* ii. 338.

This tree is very common in a wild state in the South Arcot, Trichinopoly, Tanjore, and Tinnevelly districts; it is extensively planted in gardens for ornamental purposes, and is to be seen in most compounds at Madras; when in flower it is exceedingly beautiful. it is also wild in Ceylon, and is there calld Ratu-wàa, the wood is close grained, hard and durable, works smoothly and stands a good polish, when fresh it is deep rose colored but eventually turns reddish brown. A cubic foot unseasoned weighs 75-80 *lbs., and when seasoned* 63 *lbs., and its specific gravity is* 1·008 *; it is well adapted for articles of turnery, such as naves of wheels and handles of instruments.*



Cassia Roxburghii, D.C.

ORDER XXXIV.—LEGUMINOSÆ.

Calyx of 5 or rarely fewer, usually united, sepals campanulate or tubular, more or less divided into 5 or fewer teeth or lobes, or rarely the sepals entirely distinct. Corolla of 5 or rarely fewer petals, perigynous or rarely hypogynous, very irregular in the first suborder, less so in the second, small regular and the petals often united in the third. Stamens twice the number of petals, rarely fewer or sometimes indefinite, inserted with the petals. Ovary single (consisting of a single carpel), with 1, 2, or more ovules arranged along the inner or upper angle of the cavity; style simple. Fruit a pod, usually flattish and opening round the margin in 2 valves, but sometimes follicular or indehiscent, or variously shaped. Seeds with 2 large cotyledons, a short radicle, and, with few exceptions, little or no albumen. Herbs, shrubs, trees or climbers. Leaves alternate or rarely opposite, usually furnished with stipules, compound or reduced to a single leaflet or to a dilated petiole, or in a few cases really simple, the leaflets or leaves entire or rarely toothed or lobed. Flowers in axillary or terminal racemes spikes or clusters, when terminal often becoming leaf-opposed by the growth of a lateral shoot, rarely solitary and axillary.

This is the largest order of phænogamous plants next to Compositæ, and it is widely distributed over the whole of the world. In Southern India it is abundantly represented by small herbaceous plants and creepers not coming within the scope of this work, but the valuable trees which it yields renders it about the most important order in a forest view.

All the species are known by their fruit being a legume or pod but the flowers of the 3 different suborders differ considerably, in the first Suborder Papilionaceæ, the flowers are very irregular and always in shape and appearance like that of the common pea, the upper petal or standard being always outside in the bud and all the petals imbricate; in the 2nd Suborder Cæsalpiniæ, the flowers are more regular and open in shape, the petals imbricate in the bud, like the common Cassia. In the 3rd Mimoseæ, the flowers are small and regular, generally sessile in spikes or heads, very rarely shortly pedicellate, the petals valvate.

PAPILIONACEÆ.—Though herbaceous plants of this suborder are very abundant at the higher elevations on our mountains, none of the trees ascend much above 4000 feet. The *Dalbergia latifolia* (the black wood, or rose wood of India) is the most valuable tree, it is abundant throughout the Presidency from the plains up to a little above 4,000 feet, but the finer trees are only found in the subalpine forests at elevations from 1000 to 4000 feet, where they often attain a girth considerably over 20 feet; it grows both in the dry deciduous forests and in moist ever green sholas, but generally affects the former. Next in importance are the *Pterocarpus marsupium* (the Vengay), and the *Pterocarpus santalinus* (Red sanders), the former, one of our most valuable trees, is found everywhere throughout the Presidency, but chiefly in subalpine tracts, where it grows to be an immense tree; it ascends to about 4,000 feet; the latter is only a small tree, and is confined to the dry forests about Cuddapah, North Arcot, and the south part of the Kurnool district, it is most valuable both as a timber and as a dye-wood, and the roots and stumps have been selling in the European market at £8 the ton; the tree is most abundant in the small area it affects, but the destruction of saplings by cow-herds is incalculable. The *Ougeinia dalbergioides* and the *Ormosia Travancorica* are also very valuable timber trees, the former abundant in the northern part of the peninsula (the Godavery forests and Bombay presidency), but very rare to the south; the latter common in all our Western ghat forests up to 3,000 feet, from Canara down to Cape Comorin. The *Pericopsis* is a very valuable timber confined to Ceylon. The *Dalbergia sissoo* and *Pterocarpus Indicus* are also most valuable as timber trees, but are only met with in a planted state in this Presidency. Of less valuable trees this suborder yields the *Dalbergia paniculata* and *Dalbergia frondosa*, the 5 *Erythrinas*, valuable as a substitute for deal, the *Butea frondosa* and the *Pongamia glabra*, giving a total of 17 trees; of large shrubs or small trees it yields 13, viz., *Indigofera pulchella*, *Mundulea suberosa*, *Sesbania grandiflora* and *Ægyptiaca*, *Desmodium cephalotes* and *congestum*, *Calpurnia aurea*, and 6 species of *Sophora*.

CÆSALPINIEÆ.—This suborder gives us about 25 trees and 6 shrubs: of the former, *Hardwickia binata*, (the àchá), *Tamarindus Indica* (the tamarind), *Acrocarpus fraxinifolius*, and *Dialium ovoideum*, are most valuable timber trees; the first is found in dry forests about the Coimbatore district, Cuddapah, Mysore, North Arcot, Kurnool, &c.; it does not ascend the mountains to any elevation; the Acrocarpus is confined to our western jungles, but is found in them from Canara down to Cape Comorin; and the Dialium is peculiar to Ceylon. Of less important trees, there are 5 Bauhinias, 4 Cassias (very good timber), 1 Cynometra, 1 Crudia (Ceylon), 1 Saraca (the beautiful Asok, formerly called Jonesia), 2 Poincianas (1 introduced), 1 Parkinsonia (introduced), and 1 Cæsalpinia (the Sappan), a valuable dye wood common on the western coast. Of shrubs there are 5 Cassias and 1 Bauhinia; 2 of the shrubby Cassias ascend the mountains to the higher elevations, but all the rest of the species are tropical or subtropical, not ascending the mountains above 3000 or 4000 feet.

MIMOSEÆ.—This suborder gives us 24 trees and 4 shrubs, almost all good timber. Of trees there are 8 Acacias, 6 Albizzias, 5 Pithecolobiums, 2 Adenantheras, 1 Prosopis, 1 Dichrostachys, and 1 Xylia; of shrubs, 3 Acacias and 1 Pithecolobium. The Xylia, the Prosopis, and some of the Acacias and Albizzias rank amongst our best timbers. Almost all the species are generally distributed all over the Presidency. The Pithecolobium coriaceum and Anamallayanum, are confined to the higher elevations 4-7000 feet, and some of the Albizzias and Pithecolobium bigeminum ascend to 3-4000 feet, but all the other species are confined to the plains and lower subalpine forests. The Acacias are thorny trees with free stamens, the Albizzias unarmed trees with monadelphous stamens and straight thin legumes; the Pithecolobiums trees with monadelphous stamens and twisted legumes.

SUB-ORDER I, PAPILIONACEÆ.—Flowers 5 merous. Corol very irregular, pea-shaped, the petals imbricate, the upper one (standard) always outside in the bud. Stamens 10, very rarely 9 or 5.

Tribe I, Galegeæ.—Leaves pinnate (rarely reduced to 3 or 1 leaflets) stipellæ none or setaceous, upper stamen usually free at least at the base, the others united into a sheath, very rarely all united, filaments filiform, pod not articulate, 2-valved.

Anthers gland tipped	INDIGOFERA.
Anthers without glands, legume linear flatly compressed, valves thick	MUNDULIA.
Anthers without glands, legume long narrow and thick, the endocarp continuous with the transverse partition	SESBANIA.

Tribe II, Hedysareæ.—Pod separating into 1 seeded articles, or the whole pod 1 seeded and indehiscent.

A tree racemes fascicled from nodes on the branches ... ... OUGEINIA.
Shrubs or small trees, flowers in axillary umbels (or terminal in racemes or panicles) ... DESMODIUM.

Tribe III, Phaseoleæ.—Leaves pinnately 3 foliate or 1 foliate, rarely 5 or 7 foliate, generally with stipellæ, upper stamen usually free, at least at the base or all but the base, anthers uniform or nearly so, pod not articulate, 2 valved.

Thorny trees ... ... ERYTHRINA.
Unarmed ... ... BUTEA.

Tribe IV, Dalbergieæ.—Leaves pinnate with 3-5-or more leaflets, stipellæ none or small and subulate, stamens all united into a sheath or tube, or into 2 parcels of 5, very rarely the upper one free ; pod indehiscent,

Pod flat and thin oblong or linear .. .. DALBERGIA.
Pod suborbicular surrounded with a broad wing ... . PTEROCARPUS.
Pod flattened but thick, with obtuse sutures ... ... PONGAMIA.

Tribe V, Sophoreæ.—Leaves pinnate with several leaflets without stipellæ, stamens all free or scarcely united at the base.

Pod moniliform terete, indehiscent or at length tardily 2 valved ... ... SOPHORA.
Pod shortly oblong, hard, woody, not winged, dehiscent, seed scarlet ... ... ORMOSIA.
Pod coriaceous indehiscent, the sutures with a margin or slight wing ... ... PERICOPSIS.

SUB ORDER II, CÆSALPINIEÆ.—Flowers usually 5 merous, petals often absent, when present nearly regular or irregular imbricate in the bud, with the upper petal inside, stamens 10 or fewer free or rarely some or all united.

Tribe VI, Eucæsalpinieæ.—Leaves all bipinnate except in Parkinsonia, calyx-segments free to the disk, petals 5 slightly unequal, anthers versatile, ovary or the stipe of the ovary free.

Leaves bipinnate.
Calyx tube short, segments imbricate, stamens 10 ... ... CÆSALPINIA.
Calyx tube campanulate, segments open, stamens 5 ... ... ACROCARPUS.
Calyx segments valvate, stamens 10 ... ... POINCIANA.
Leaves pinnate ... ... PARKINSONIA.

Tribe VII, Cassieæ.—Leaves unequally or abruptly pinnate, calyx-segments or sepals 5 free to the disk, petals 5 or none, anthers basifixed or rarely versatile, ovary or the stipe free.

Petals 5, stamens 5-10, leaves abruptly pinnate ... ... CASSIA.
Petals 0, stamens 2, leaves unequally pinnate ... ... DIALIUM.

Tribe VIII, Bauhinieæ.—Leaves simple entire 2 lobed, or rarely 2 foliate, calyx gamosepalous above the disk, or valvately parted, petals 5, anthers versatile, the stipe of the ovary free or adnate to the tube of the calyx. BAUHINIA.

Tribe IX, Amherstieæ.—Leaves abruptly or rarely unequally pinnate, 2 many (rarely only 1) foliate, calyx-segments free to the base imbricate or rarely valvate, petals 5 fewer or none, anthers versatile, the stipe of the ovary adhering to the tube of the calyx.

Petals 5 subequal or 3 subequal and 2 rudimentary or wanting, stamens free 10, all perfect or 5 minute and sterile, leaflets 1 many pair ... ... HUMBOLDTIA.
Petals 3 perfect, 2 rudimentary, stamens monadelphous 2-3 only perfect ... . TAMARINDUS.
Petals none, stamens 3-9, leaves abruptly pinnate ... ... SARACA.
Petals none, stamens 10, leaves equally pinnate ... ... CRUDIA.

Tribe X, Cynometreæ.—Leaves abruptly pinnate 2-many-foliate ; calyx segments free to the disk imbricate or valvate, petals 5 or fewer or none, anthers versatile.

Petals 0. ... ... HARDWICKIA.
Petals 5. ... ... CYNOMETRA.

SUB ORDER III, MIMOSEÆ.—Flowers small regular sessile in spikes or heads ; or rarely shortly pedicellate (Adenanthera and Prosopis), sepals and petals valvate and often united, stamens equal to or double the number of the petals or indefinite, radicle straight, leaves bipinnate.

Tribe XI, Adenanthereæ.—Stamens twice as many as the petals, free, anthers gland-tipped.

Flowers shortly pedicellate, legume compressed linear membranaceous with transverse partitions between the seeds, slightly tomentose ... ... ADENANTHERA.
Flowers sessile or very shortly pedicellate, legume continuous filled with pulp linear cylindrical slightly compressed torulose, at length crumbling to pieces ... ... PROSOPIS.
Flowers sessile, the lower ones neuter, legume contorted coriaceous indehiscent ... ... DICHROSTACHYS.
Legume large, broadly falcate, woody and 2 valved ... ... XYLIA.

Tribe XII, Acacieæ.—Stamens numerous free, usually short. ... ... ACACIA.

Tribe XIII, Ingeæ.—Stamens numerous united into a tube, usually long.

Pod straight thin ... ... ALBIZZIA.
Pod curved or spiral often thick and pulpy inside ... ... PITHECOLOBIUM.

SUB ORDER 1.—PAPILIONACEÆ.

Sepals united in a campanulate or tubular calyx, 5-toothed or cleft or 4-toothed by the complete union of the 2 upper sepals, or 2-lobed, the upper lobe or lip entire or 2-toothed, the lower entire or 3-toothed, rarely irregularly split. Corolla very irregular usually *papilionaceous*, that is of 5 petals, the upper one or *standard (vexillum)* outside in the bud, the 2 lateral ones or *wings (alæ)* intermediate, the 2 lowest ones more or less united along the lower edge or approximate, face to face, into a boat-shaped *keel (carina)* more or less enclosing the stamens and style. Stamens usually 10, either all free or all united in a tube or sheath enclosing the style, closed or open along the upper edge, or the upper stamen more or less free from the others, the filaments all free for some distance under the anthers. Ovules usually amphitropous, and the radicle of the embryo more or less curved over the edge of the cotyledons, rarely short and straight.

TRIBE—GALEGEÆ.

INDIGOFERA. LINN.

Gen. Char. : Calyx tube short broad and oblique, the teeth or lobes nearly equal or the lowest longest. Standard ovate or orbicular, sessile or narrowed into a short claw ; keel erect, obtuse or acuminate, with a hollow protuberance or spur on each side. Upper stamen free from the base, the others united in a sheath open on the upper side ; anthers uniform, tipped by the point of the connectivum resembling a small gland. Ovary sessile or nearly so, with several or rarely 1 or 2 ovules ; style incurved at the top, with a terminal stigma. Pod oblong, linear or rarely globular, terete or rarely flattened, straight or incurved, 2 valved, divided transversely between the seeds by cellular tissue. Seeds globular, or truncate at each end, or flattened, not strophiolate. Herbs, undershrubs, shrubs or small trees, more or less clothed or sprinkled with adpressed hairs attached by the centre, sometimes mixed with loose hairs or tomentum. Leaves 1 foliate or pinnate with 3 or more leaflets, occasionally stipellate. Stipules small setaceous. Flowers usually red or purple, in axillary spikes or racemes. Bracts usually small and deciduous. Bracteoles none. Standard usually silky-pubescent outside.

This genus, which yields the Indigo of commerce, is represented by numerous herbs or undershrubs, but the following is the only species in Southern India which attains the size of a small tree or large shrub.

1. INDIGOFERA PULCHELLA, *Roxb.*—A large erect shrub or small tree, young parts usually whitish with short adpressed hairs ; branches angled, leaves pinnated ; leaflets 8-10 pairs obovate or broad elliptic, emarginate, mucronate ; racemes about the length of the leaves, sessile many flowered, springing from the axils of the leaves and from the former years' leafless branches ; flowers large at first crowded, afterwards more distant : calyx-segments short and acute ; petals many times longer than the calyx, patulous and resembling a bilabiate corolla, legumes scattered along the rachis, slightly deflexed, nearly cylindrical, thick, straight, sharp pointed, 10-12 seeded, sutures callous, thick. *Roxb. Fl. Ind.* iii. *p.* 382 ;—*WA. Prod. p.* 203. Indigofera purpurescens, *Roxb. Fl. Ind.* iii. *p.* 383.

A large, showy, flowering shrub, or often a small tree, very common on the Nilgiris, Pulneys, Anamallays, and other hills in this Presidency, up to considerable elevations, also found on the hills on the eastern coast.

Indigofera arborea, *Roxb.*, atropurpurea, *Roxb.*, and violacea, *Roxb.*, also grow to large shrubs or small trees in Bengal, but are not found except in gardens in this Presidency.

Analysis of Genera, Pl. XII, fig. 1.

1. A leaf (life size).
2. Portion of a raceme (life size).
3. A flower.
4 & 5. The same opened out to show the different parts.
6. Anthers, front and back view.
7. Ovary cut lengthways.
8. The ripe legume (life size).

MUNDULEA. DC.

Gen. Char. : Calyx campanulate shortly 5 toothed, the 2 upper teeth subconnate, vexillum ample spreading, with transverse callosities above the short claw, alæ falcato-oblong slightly cohering with the keel, keel obtuse incurved at the apex, stamens diadelphous, the upper one free at the base, connate with the others at the middle, filaments slightly dilated at the apex, anthers uniform, ovary many ovuled, style incurved glabrous subterete, stigma capitate, legume linear flatly compressed, valves very thick tardily dehiscing, seed reniform estrophiolate. Shrubs or small trees, silky-pubescent, leaves unequally pinnate, leaflets entire reticulately penniveined, stipules small, racemes terminal, flowers showy rose or white.

1. MUNDULEA SUBEROSA, *Roxb.*—A small tree with a very corky cracked bark, trunk erect soon branching out into a ramous head, ends of the branches and young shoots tomentose, leaves unequally pinnate 6-9 inches long, leaflets 6-9 pair opposite, subopposite or alternate elliptic oblong, often gradually narrowed towards the apex obtuse and sometimes mucronulate, subglabrous above, silky beneath, 1-2 inches long by ¼ inch broad, racemes terminal, flowers large rose or white, in pairs long pedicelled ; legume irregularly contracted between the seeds, about 4 inches long.—Robinea suberosa, *Roxb. Fl. Ind.* iii. 327. Tephrosia suberosa, *WA. Prod. p.* 210. Mundulea suberosa, *Benth.*

This small tree is very ornamental when in flower, as it is perfectly covered with blossoms ; one variety has rose flowers and another white ; it is common about subalpine jungles on both sides of the Presidency, and particularly abundant in Tinnevelly.

Analysis of Genera, Pl. XII, fig. 2.

1. Portion of a leaf (life size).
2. A flower (life size).
3. The same opened.
4. Vexillum, showing the callosities.
5. The free vexillum stamen.
6. Ovary cut open.
7. Legume (life size).

SESBANIA. Pers.

Gen. Char. : Calyx-tube broad, truncate, or with nearly equal teeth or lobes. Standard orbicular or ovate, spreading or reflexed ; keel incurved, obtuse or acuminate, the claws much longer than those of the other petals. Upper stamen free, geniculate near the base, the others united in a sheath angled near the base, anthers uniform or nearly so. Ovary with several ovules ; style glabrous, with a small terminal stigma. Pod long and linear (or oblong), 2-valved or indehiscent, the endocarp continuous with spurious transverse partitions separating the seeds. Seeds without any strophiole. Trees, shrubs or herbs, but of very few years' duration. Leaves abruptly pinnate, with numerous entire leaflets, the stipellæ minute or none. Stipules setaceous, usually very deciduous. Flowers yellow, red, variegated or white, in short loose axillary racemes ; pedicels slender. Bracts and bracteoles very rarely persistent to the time of flowering.—Agati, *Desv.*

1. Sesbania grandiflora, *Desv.*—A small tree, 20-30 feet high, but of only a few years' duration, glabrous and more or less glaucous, leaflets 10-30 pairs oblong or elliptical obtuse and often mucronate 1-1½ inches long, racemes short, flowers 2-4 very large white or red, calyx-tube ¾ inch long without the turbinate base, the teeth short and broad, petals 2-3 inches long, standard ovate rather shorter than the others, keel much incurved ending in an obtuse beak, pod upwards of a foot long about 3 lines broad.—Æschynomene grandiflora, *Roxb. Fl. Ind. vol.* iii. *p.* 330. Agati grandiflora, *Desv.* Coronilla grandiflora, *Willd.* iii. 1145. Agati, *Rheede Mal.* 1. *t.* 51.

A small tree 20-30 feet, common in the vicinity of villages and in gardens all over India and also in Australia, I have never met with it truly wild. The wood is useless except for fuel, the leaves and tender pods are eaten in curries by the natives, and cattle are very fond of them ; the tree is called Agati in Tamil and Avesi in Teligu ; it is in flower and fruit at all seasons.

2. Sesbania Ægyptiaca, *Pers.*—A small tree of only a few years duration, glabrous and somewhat glaucous, the branches terete or obscurely angled, leaflets 10-20 pairs, oblong obtuse 4-12 lines long, flowers in loose pendulous racemes shorter than the leaves, bracts and bracteoles very deciduous. Calyx about 3 lines long without the narrow turbinate almost stalk-like base, the teeth very short and broad, standard about ¾ inch broad, keel much incurved broad obtuse with an acute angle at the base, pod 8-10 inches long, 2-2½ lines broad. *Pers.* ;—*DC. Prod.* ii. 264. Æschynomene sesban, *Roxb. Fl. Ind.* iii. *p.* 332.

A beautiful little tree common in the vicinity of villages and cultivated land, the flowers are generally purple with yellow spots, but one variety has yellow flowers, and another red. The wood is said to make the best charcoal for gun-powder.

Analysis of Genera, Pl. XII, fig. 3.

1. Portion of a leaf (life size).
2. A flower.
3. The same open, showing the 9 monadelphous stamens and 1 free stamen.
4. Vexillum, showing the callosities.
5. Anthers, front and back view.
6. Ovary cut open.
7. Legume (life size.)

TRIBE—HEDYSAREÆ.

OUGEINIA. Benth.

For Gen. Char. see letter press to Pl. xxxvi.

1. Ougeinia dalbergioides, *Benth.*—For description, &c. see Pl. xxxvi. I have lately detected this tree on the Nilgiri mountains.

DESMODIUM. Desv.

Gen. Char. Calyx-tube short, the 2 upper lobes more or less united. Standard from oblong to orbicular, narrowed at the base ; wings oblong, usually adhering in the middle to the keel.; keel obtuse. Upper stamen free or more or less united with the others in a sheath or tube, anthers uniform. Ovary sessile or stipitate with 2 or more ovules, style incurved, subulate. Pod longer than the calyx, flat, one or both sutures indented between the seeds, separating into indehiscent 1 seeded articles, or rarely the articles opening on the lower edge in 2 valves, and then not always readily separating Herbs, shrubs, or rarely small trees. Leaves pinnately 3 foliolate or 1 foliolate, with stipellæ. Stipules usually dry, striate, membranous. Flowers purple, blue, pink or white, usually small, in terminal racemes or panicles, or rarely in axillary umbels or clusters.—Dendrolobium, *WA.* Dicerma, *DC.* Nicolsonia, *DC.* Phyllodium, *Desv.* Pteroloma, *Desv.* Catenaria, *Benth. Fl. Aust.* ii. *p.* 229.

1. DESMODIUM CEPHALOTES, *Wall.*—A shrub or small tree, old branches glabrous, young shoots obtusely triangular clothed with whitish pubescence, leaves trifoliate, leaflets oblong lanceolate nearly glabrous except the white pubescent parallel nerves beneath, stipules lanceolate acuminate, peduncles axillary solitary several times shorter than the petioles, flowers numerous white somewhat umbelled calyx segments broad about equal, legumes compressed 2-6 jointed. *WA. Prod. p.* 224. Hedysarum umbellatum, *Roxb. Fl. Ind.* iii. *p.* 360. *et H.* cephalotes, *l. c.* D. congestum, *WA. l. c.*

This shrub forms the chief undergrowth in some of our Teak forests; it is very abundant on the Anamallays and other subalpine forests on the west side of the Presidency, and is also found on the eastern mountains and occurs in Ceylon; it frequently grows to be a small tree, with a trunk about 10 inches in diameter.

Analysis of Genera, Pl. XII, fig. 4.

1. A head of flowers and a leaf (life size.)
2. A flower.
3. Legumes (life size.)
4. Section of a legume (copied from Wight's Icones.)

2. DESMODIUM UMBELLATUM, *DC.*—A bushy shrub, occasionally growing into a small tree, the young shoots silky. Leaflets 3 ovate or oval-oblong, obtuse or rarely almost acute, mostly 1½-2 inches long, glabrous or nearly so above, pale or silky pubescent underneath, with prominent primary veins. Stipules very deciduous. Flowers white, in dense axillary umbels on a common peduncle, rarely attaining ½ inch. Bracts very deciduous. Pedicels as long as the calyx. Bracteoles persistent, as along as the calyx-tube. Calyx silky, about 2 lines long, the lobes acute, not longer than the tube. Standard broad, twice as long as the calyx; wings much shorter; keel as long as the standard, without lateral protuberances. Pod of 3 or 4 thickish almost fleshy articles, each 3 or 4 lines long and not so much in breadth, not reticulate, indehiscent. *Benth. Fl. Aust.* ii. *p.* 230;—*WA. Prod. p.* 224.

This small tree or shrub is met with in similar localities as the last, and also occurs in Ceylon and Queensland.

TRIBE—PHASEOLEÆ.

ERYTHRINA. LINN.

For Gen. Char. see letter press to Pl. clxxv.

1. ERYTHRINA STRICTA, *Roxb.*—For description, &c. see Pl. clxxv.

2. ERYTHRINA INDICA, *Lam.*—A pretty large deciduous tree, trunk pretty straight short but thick, branches many forming a shady head, the younger ones armed with small black sharp prickles which generally fall off about the 3rd or 4th year, leaving the trunk and large branches unarmed, stipules falcate, petioles and leaves unarmed, leaflets glabrous entire, the terminal one broadly cordate, racemes terminal horizontal, calyx spathaceous contracted and 5-toothed at the apex, vexillum about 3 times shorter than the calyx, and about 4 times longer than the alæ, keel about the length of the alæ its petals distinct, stamens monadelphous with the sheath entire at the base, thence diadelphous with the tube split, ovary 10-15-ovuled, legume 6-12 inches long cuspidate very protuberant at the seeds and on each margin, when ripe blackish, seeds 6-8 oblong smooth blackish purple. *Roxb. Fl. Ind.* iii. *p.* 249;—*WA. Prod. p.* 260.

This tree is common throughout India, particularly about native villages, and it is much employed to support the pepper vine. It grows most readily from large cuttings, it flowers at the commencement of the hot season, and is then very showy as the flowers are large bright scarlet and produced in great quantity, the timber is light and soft and known (with the other species) as mootchee wood and much employed for toys, scabbards, light boxes, packing cases, &c. The plant is often used as a hedge, it is called Murukà in Tamil and Modugu in Teligu, it also grows in Ceylon and Australia, in the former island it is called Errabadu, and is used medicinally for men and cattle, and the young tender leaves are eaten in curries.

3. ERYTHRINA SUBEROSA, *Roxb.*—A small or middling sized tree with a corky deeply cracked bark, branches almost unarmed except at the insertion of the petioles, stipules lanceolate, petioles pubescent prickly, leaves unarmed, leaflets tomentose on the under side, terminal one rhomboid and acuminated sometimes reniform and rounded, racemes axillary or sometimes terminal spreading, calyx tubular 2 lipped, vexillum 5-6 times longer than the calyx and more than twice the length of the keel, keel cordate many times longer than the very minute alæ its petals united, stamens monadelphous, legume 2-3 seeded. *Roxb. Fl. Ind.* iii. *p.* 253;—*WA. Prod. p.* 260.

This tree is not uncommon in dry subalpine jungles throughout the Presidency, Northern Circars, Mysore, &c., it is known by the same native names as E. Indica and the wood is very similar.

4. ERYTHRINA SUBLOBATA, *Roxb.*—A large tree, trunk erect often of great size, branches spreading very numerous, the larger as well as the trunk without prickles and covered with thick bark, the inner stratum of which is fibrous, the middle yellow and farinaceous, the exterior smooth hard and yellow, prickles strong conical very sharp exceedingly numerous on the younger branches covering them almost entirely, leaves 12 18 inches long unarmed, leaflets the pair obliquely cordate the terminal one rhombic all variously lobate-sinuate or notched, in age smooth above, beneath covered with soft white down 5-6 inches each way, petioles long, terete pubescent without prickles, racemes terminal erect slender, calyx tubular 2 lipped, vexillum 5-6 times longer than the calyx 2-3

times longer than the keel, keel cordate several times longer than the minute alæ, its petals united, stamens monadelphous, legume 2-3 seeded. *Roxb. Fl. Ind.* iii. *p.* 255 ;—*WA. Prod. p.* 261.

This tree is found in the subalpine jungles on the eastern coast of this Presidency and on the North Arcot and Cuddapah hills, &c., its wood is similar to the other species, and it has similar native names.

5. Erythrina ovalifolia, *Roxb.*—A good sized tree, trunk straight, bark very thick and deeply cracked, branches numerous armed with innumerable small sharp black pointed prickles, leaflets oval entire, above pale green and covered with a few scattered depressed hairs, beneath very hoary, 4-6 inches long by 2-3 broad, petioles armed with a few prickles and furnished with 2 umbilicate glands at the insertion of the pair of leaflets and 2 similar ones at its apex, stipules small hard, racemes simple terminal horizontal from 1 to 6, flowers numerous dark red in threes round the raceme on downy erect pedicels, bractes of the pedicels four fold, viz., one below the insertion of each lateral pedicel and two to the central one, small downy, those of the calyx 2 small opposite ; calyx bursting open irregularly downy on the outside, vexillum twice the length of the keel erect, broad cordate emarginate, claw long and tapering, alæ a third shorter than the keel with the extremities colored, filaments diadelphous 9 and 1. *Roxb. Fl. Ind.* iii. *p.* 254;—*Wight Icones* 247.

This tree is found in Ceylon and Bengal. I have never observed it in this Presidency, but it probably occurs.

BUTEA. Roxb.

For Gen. Char. see letter press to Pl. clxxvi.

1. Butea frondosa, *Roxb.*—For description, &c. see Pl. clxxvi.

Butea superba is a very large creeper common on the mountains of the eastern coast.

TRIBE—DALBERGIEÆ.

DALBERGIA. Linn.

For Gen. Char. see letter press to Pl. xxiv.

1. Dalbergia latifolia, *Roxb.*—For description, &c. see Pl. xxiv.

2. Dalbergia Sissoo, *Roxb.*—For description, &c. see Pl. xxv.

3. Dalbergia paniculata, *Roxb.*—A large tree, trunk erect, bark smooth light ash-colored, branches numerous spreading, leaves 4-5 inches long, leaflets 5-6 pair oblong to obovate-oblong emarginate glabrous 1-1½ inches long by about 1 broad, stipules lanceolate falcate, panicles terminal leafy large, flowers numerous small whitish with a tinge of blue, calyx of a deep blackish purple hairy 5 cleft the lowest segment the longest and narrowest, alæ as long as the vexillum, which latter has no callosities, keel half the length of the alæ the 2 petals only slightly united for a little way at the middle, stamens diadelphous 5-5, ovary glabrous, legume lanceolate 1-2 seeded. *Roxb. Fl. Ind.* iii. 227.

This tree is common in the plains and subalpine dry forests throughout the Presidency ; its wood is white and not of much value, though in use with the natives for building and common purposes, it is very liable to the attack of insects. The tree is known in the Godavery forests by the Teligu name Porilla sopara, and in the Circars it is called Tello patsaru ; a cubic foot of the wood unseasoned weighs about 60 lbs., and 48 lbs. when seasoned ; its specific gravity is 768.

4. Dalbergia frondosa, *Roxb.*—A good sized tree, trunk erect, bark smooth and light ash-colored, leaflets about 5 pairs oval emarginate silky when young subglabrous in age, 1-1½ inches long by 1 broad, deciduous in the cold season and appearing with the flowers in April or May, stipules lanceolate falcate caducous, panicles pubescent axillary solitary shorter than the leaves composed of a few alternate ascending simple secund branches, flowers pale blue small, bractes small lanceolate villous early caducous, the largest below each pedicel the 2 pressing the calyx laterally, calyx hoary the 2 upper segments obtuse, lower ones more acute, lowest the narrowest and longest, vexillum with a large callosity at the base of the limb, alæ as long as the vexillum and twice as long as the keel, stamens equally diadelphous 5 5, ovary very slightly pubescent, legume lanceolate 1-4 (usually 2) seeded. *Roxb. Fl. Ind.* iii. 226 ;—*WA. Prod. p.* 266.

This tree is common in many of our subalpine forests and in Ceylon. I do not know whether it is the D. lanceolaria of Linn., but Mr. Dalzell refers it to that species ; it yields a useful timber, which is good for building purposes ; in the Godavery forests it is called Podda sopara (Teligu), and in the Circars Yerra patsaru (Teligu), on the Bombay ghats it is called Dandous ; the bark, and an oil obtained from the seeds are in use medicinally with the natives.

PTEROCARPUS. Linn.

For Gen. Char. see letter press to Pl. xxi.

1. Pterocarpus marsupium, *Roxb.*—For description, &c. see Pl. xxi.

2. Pterocarpus santalinus, *Linn.*—For description, &c. see Pl. xxii.

3. Pterocarpus Indicus, *Willd.*—For description, &c. see Pl. xxiii.

PONGAMIA. VENT.

For Gen. Char. see letter press to Pl. clxxvii.

1. PONGAMIA GLABRA, *Vent.*—For description, &c. see Pl. clxxvii.

TRIBE—SOPHOREÆ.

CALPURNIA. E. MEY.

Gen. Char. Calyx teeth short broad, 2 upper ones subconnate, vexillum suborbicular erect or sub-recurved ; alæ falcato oblong ; keel incurved obtuse, its petals cohering at the back, stamens free, or 9 very shortly united at the base, anthers versatile generally small, ovary stipitate many ovuled, style incurved subulate, stigma small terminal, legume linear flatly compressed membranaceous indehiscent, the upper suture with a slight wing, seed compressed oval-oblong transverse, radicle inflexed. Shrubs or trees, leaves unequally pinnate, leaflets numerous without stipels ; stipules small inconspicuous, flowers yellow in axillary racemes or in panicles at the apex of the branches, bractes small, bracteoles none.

1. CALPURNIA AUREA, *Lam.*—A large shrub, young shoots slightly pubescent, leaflets about 9 or 10 pairs, oval obtuse nearly glabrous opposite or subopposite, stamens 9 very slightly joined at the base, the 10th quite free, ovary pubescent, legume at length glabrous. *Benth. and Hook. Gen. Pl.* ii. *p.* 554. Virgilea aurea, *Wight. Ill. tab.* 81 ;—*WA. Prod. p.* 179. Robinea subdecandra, *L'herit.* R. Heynei, *Wall.* Podalyria aurea, *Willd.*

This showy shrub is common on the Denkinacottah hills (Salem) and in the subalpine jungles at Courtallum, &c.

Analysis of Genera, Pl. XII, fig. 5.

1. Portion of a leaf (life size.)
2. A flower opened, showing the calyx, one of the alæ, the keel, and the stamens (9 and 1.)
3. The vexillum.
4. The stamens.
5. Anthers, front and back view
6. Ovary cut open.
7. The legume, showing the winged upper margin.

SOPHORA. LINN.

Gen. Char. Calyx teeth very short. Standard broad, erect or reflexed ; wings oblong, erect, free ; keel-petals like the wings or rather larger, overlapping each other at the back but scarcely united. Stamens 10, free, or 9 of them slightly connected in a ring at the base ; anthers uniform. Ovary shortly stipitate, with several ovules ; style incurved, with a minute terminal stigma. Pod moniliform, fleshy, coriaceous or woody, indehiscent or opening at length in 2 valves, each seed enclosed in a separate cell. Seeds globular, oblong or flattened ; cotyledons fleshy ; radicle very short and straight or more or less elongated and inflexed. Trees, shrubs or rarely under shrubs. Leaves unequally pinnate, without stipellæ or with very small setaceous ones. Stipules small. Flowers white, yellow or rarely violet-blue, in racemes either simple and terminal or forming large terminal panicles. Bracts small, deciduous ; bracteoles usually none. Edwardsia, *Salisb.* Styphnolobium, *Schott.* Broussonetia, *Orteg.*

1. SOPHORA HEPTAPHYLLA, *Linn.*—A small tree or shrub, leaflets alternate 7-13 ovate oblong to elliptic acuminate glabrous above pubescent beneath, 3-4 inches long by 1-1¼ broad. Stipules subulate, racemes leaf-opposed lax about the length of the leaves, flowers numerous, bractes subulate, calyx pubescent campanulate suboblique slightly 5 toothed, ovary 3-4 ovuled, legume villous 2-4 seeded attenuated at the apex, much contracted between the seeds, seeds 2-4 oval bright shining red. *Wight Icones tab.* 1155.

This small tree is common on the northern and western slopes of the Nilgiris and in Ceylon, 4000-7000 feet, but I have not observed it elsewhere.

2. SOPHORA GLAUCA, *Lesch.*—A large shrub, leaflets 19-23 elliptical mucronate upper side glaucous and velvetty, under villous, racemes terminal crowded. *DC. Prod.* ii. 95 ;—*Wight Icones tab.* 979.

A common shrub on our western mountains.

3. SOPHORA MADRASAPATANA, *Wight.*—A shrub, leaflets about 25 glabrous from elliptic to subovate obtuse mucronate or retuse at the apex, 6-8 lines long by about 3 lines broad, racemes axillary and terminal very slightly pubescent many flowered, legumes villous.—Edwardsia Madraspatana, *Wight Icones tab.* 1054.

North Arcot and Cuddapah hills.

4. SOPHORA TOMENTOSA, *Linn.*— A small tree; leaflets 11-19, oval roundish very obtuse covered on both sides as well as the calyx with hoary tomentum, racemes terminal elongate. *Linn. Sp. p.* 533 ;— *WA. Prod. p.* 179 ; —*Roxb. Fl. Ind. p.* 361.

This is indigenous on the sea coast in Ceylon (Galle), but I have only seen it in gardens in this Presidency ; in Ceylon it is called Moodoomoroonga, it is also found in Australia.

5. SOPHORA VIOLACEA, *Thw.*—A middling sized shrub, branches and petioles adpressedly pilose, stipules and bractes minute subulate caducous, leaflets 7-12 pairs with an odd one elliptic obtuse very shortly mucronate slightly pilose, paler beneath, 6-15 lines long, 3-7 lines broad, petiolules ½-1 line long, racemes terminal many flowered adpressedly pilose about equalling the leaf, calyx tubular, margin 5 lobed, flowers violet, ovary about 7 ovuled, legumes slightly pilose much constricted, nodes ovoid, seed ovoid brown. *Thw. En. Pl. Zey. p.* 94.

Ceylon, in the Galle district, a very beautiful shrub.

6. SOPHORA INTERRUPTA, *Bedd.*—A large shrub, branches and petioles adpressedly pilose, stipules and bractes caducous villous, leaves 8-9 inches long, leaflets 9-14 pair with an odd one, oval very emarginate finely reticulated glabrous above slightly hairy beneath, 10-14 lines long by 6-9 lines broad, petiolules 2 lines long, racemes terminal, leaf-opposed shorter than the leaves, flowers few distant and large, on pedicels about 6 lines long, petals long clawed, ovary densely sericeous 3 7 ovuled, legume slightly pilose, often much interrupted and filiform between the nodes, each of which is completely 4 winged.

This beautiful shrub I have only observed on the Codoor hills, Cuddapah district.

Analysis of Genera, Pl. XI, fig. 6.

1. Portion of a leaf (life size).
2. The calyx.
3. The same open.
4. The vexillum.
5. One of the alæ.
6. The keel.
7. The stamens.
8 & 9. Anther, front and back view.
10. Ovary.
11. Legume (life size).

ORMOSIA. JACKS.

For Gen. Char. see letter press to Pl. xlv.

1. ORMOSIA TRAVANCORICA, *Bedd.*—For description, &c. see Pl. xlv.

PERICOPSIS. THW.

For Gen. Char. see letter press to plate clxxxvii.

1. PERICOPSIS MOONIANA, *Thw.*—For description, &c. see Plate clxxxvii.

SUB ORDER II.—CÆSALPINIEÆ.

Flowers usually 5-merous, very rarely 4-merous or 3-merous, the sepals united at the base into a short tube, lined by the disk, bearing at its margin the petals and stamens, rarely forming a campanulate or tubular calyx with the stamens near the base, as in *Papilionaceæ*, the free part of the sepals or lobes of the calyx, imbricate or rarely valvate. Corolla irregular or nearly regular, either with the petals variously imbricate in the bud, but the upper one never outside and usually quite inside, or some or all of the petals wanting. Stamens 10 or fewer, (or rarely indefinite) free or rarely more or less united, all perfect or several of them reduced to staminodia. Ovules anatropous or nearly so. Radicle of the embryo short and straight.

TRIBE—EUCÆSALPINIEÆ.

CÆSALPINIA. LINN.

Gen. Char. Sepals 5, shortly united at the base, much imbricated, the lowest one larger and concave. Petals 5, spreading, rather unequal, the upper inner one the smallest, the 2 lowest outer ones the largest. Stamens 10, free ; anthers uniform, ovate. Ovary with 2 or more ovules ; style subulate, with a small stigma. Pod flattened, obliquely ovate oblong or broadly linear-falcate, 2-valved. Seeds thick or flattened, with a very small hilum ; albumen none ; radicle short, straight. Shrubs, trees or woody climbers ; often armed with scattered recurved prickles. Leaves abruptly bipinnate. Flowers yellow, in racemes, either single in the upper axils or forming terminal panicles. Filaments more or less hairy at the base.

1. CÆSALPINIA SAPAN, *Linn.*—A small tree armed, pinnæ 10-12 pair, leaflets 10-12 pairs unequal sided obliquely oval-oblong emarginate paler and minutely dotted on the under side, flowers in terminal panicles, calyx glabrous, legumes compressed woody very hard glabrous elliptic-obovate obliquely truncated, cuspidate at the apex 3-4 seeded. *Linn. Sp. p.* 544 ;—*WA. Prod. p.* 281.

This is a small thorny tree not exceeding 2 feet in girth and coming to maturity in 12-15 years, it yields a valuable dye wood, and fetches a good price as such on the western coast, it grows in various parts of this Presidency, but I have only seen it in any quantity on the western coast, where it is extensively planted. The Forest Department have now a small plantation of it at Nellumbur ; it is easily raised from seed, and can be transplanted without any failures. The wood yields a red dye, and sells at 1½-2 Rupees the cubic foot : the powder used at the Holee festival is extracted from it.

Analysis of Genera, Pl. XIII, fig. 1.

Cæsalpinia sepiaria (the Mysore thorn), C. bonducella, C. mimosoides, C. digyna, and C. paniculata, are thorny scandent hedge plants not coming within the scope of this Flora. C. pulcherrima, *Sw.* is a large ornamental shrub only found in cultivation.

ACROCARPUS. WIGHT.

For Gen. Char. see letter press to Pl. xliv.

1. ACROCARPUS FRAXINIFOLIUS, *Wight.*—For description, &c. see Pl. xliv.

POINCIANA. LINN.

For Gen. Char. see letter press to Pl. clxxviii.

1. POINCIANA ELATA, *Linn.*—For description, &c. see Pl. clxxviii.

2. POINCIANA REGIA, *Boj.*—This well known ornamental tree, an introduction from Madagascar, is now very common in Madras, and is much planted throughout the Presidency in avenues, gardens, parks, &c.

PARKINSONIA. LINN.

Gen. Char. Sepals 5, equal, recurved, shortly united at the base. Petals 5, ovate, flat, upper one roundish and long-clawed. Stamens 10, distinct, declinate, a little longer than the claw of the upper petal. Style filiform, somewhat ascending. Legume linear-oblong, acuminated at both ends torulose at the seeds and compressed between them. Seeds oblong, the testa tumid, hilum linear, cotyledons oblong, radicle ovate. A thorny tree or shrub; thorns solitary or in threes, straight. Leaves pinnated, or occasionally bipinnate, petiole linear, very long, winged, leaflets small, obovate-oblong, often deciduous or quite abortive. Racemes lax. Flowers yellow.

1. PARKINSONIA ACULEATA, *Linn.*—A small weak tree or shrub about 12 feet in height, an introduction from South America, now quite run wild all over the Presidency about villages, Railway embankments, &c; its wood is used for fuel, and it yields a fibre valuable as a paper material.

Analysis of Genera, Pl. XIII, fig. 2.

TRIBE—CASSIEÆ.

CASSIA. LINN.

For Gen. Char. see letter press to Pl. clxxix.

1. CASSIA FLORIDA, *Vahl.*—For description, &c. see Pl. clxxix.

2. CASSIA ROXBURGHII, *DC.*—For description, &c. see Pl. clxxx.

3. CASSIA FISTULA, *Linn.*—A small or middling sized tree with a smooth bark, leaflets 4-8 pairs broadly ovate usually obtuse or retuse, sometimes slightly acuminated glabrous, petioles without glands, stipules minute, racemes terminal long lax drooping, flowers long pedicelled, legumes cylindrical pendulous glabrous smooth. *WA. Prod. p.* 285. Fistula, *DC.* Cathartocarpus, *Pers.* Cassia fistula et rhombifolia. *Roxb. Fl. Ind.* ii. *p.* 333, 334.

This tree is most gorgeous when covered with its long pendulous racemes of brilliant yellow flowers, it is very common throughout the jungles of Southern India, Bengal, Bombay, Birmah and Ceylon, and is much planted in gardens at Madras and elsewhere in the Presidency; it is called Amaltas in Hindostanee, Reylu in Teligu, Kone and Sirikone in Tamil, Kaki in South Canara, Bawa and Gurmala in Bombay, and Ahalla in Ceylon. The bark is used by tanners, and the sweet pulp contained in the pod is said to be a cure in dysentery and is a safe purgative; the wood is strong, elastic and durable, close and straight grained, of a dark brown colour often beautifully mottled, and works well; a cubic foot unseasoned weighs 72-78 lbs., and when seasoned 61 lbs., and its specific gravity is ·976; it is used in ship building and for bows and axles, and is also suited for furniture; in Birmah the tree is called Gnoo-sh-woay.

4. CASSIA GLAUCA, *Lam.*—A middling sized tree, branches numerous spreading in every direction, young ones irregularly angled almost glabrous, leaflets 4-6 pair with an erect clavate gland between each of the 2-3 lower pair, oval broadest at or below the middle, the upper ones the largest, upper side glabrous under glaucous and slightly pubescent; stipules linear, subulate falcate, racemes axillary corymbiform long peduncled erect crowded near the ends of the branches about ½ the length of the leaves, flowers large long pedicelled, the pedicels subtended by an ovate acuminated caducous bracteole, petals all nearly equal, anthers all fertile, equally long, the 2 lower on rather longer filaments than the others, legumes drooping linear straight thin glabrous, the margin a little tumid. *Lam. Ency. Meth.* i. *p.* 647;—*WA. Prod. p.* 289. C. arborescens. *Roxb. Fl. Ind.* ii. 345. Wellia tagera, *Rheede Mal.* 6 *t.* 9 *and* 10.

This tree, which is common in gardens, is also met with in the jungles on the eastern side of the Presidency and in Ceylon.

5. Cassia tomentosa, *Linn.*—A large shrub very common on the Nilgiris and Ceylon mountains at the higher elevations. 6. Cassia Timoriensis, *DC.*—A large shrub common on the slopes of the Nilgiris and other mountains, and in Ceylon. 7. Cassia montana, *Heyne.* A large shrub abundant in dry jungles about Salem, South Arcot, Trichinopoly and further south. 8 Cassia auriculata, *Linn.* A small shrub (called Tangedu in Teligu) very common in the plains throughout the Presidency, and much in use for tanning and dyeing purposes. 9. Cassia alata, *Roxb.* A large shrub introduced from the West Indies, but now quite run wild and met with in our jungles, and known as an effectual remedy for the Malabar ring-worm. 10. C. Goensis, *Dlaz.* A large shrub, foot of the Bombay ghats. None of the above grow to be trees of any size, and with the exception of the Cassia auriculata, which comes under the head of *Forest products* as *Tangedu bark*, they are only of use as fuel. This genus yields the Senna of commerce, much cultivated in some parts of the Presidency, and there are a great many herbaceous or annual species wild throughout India.

DIALIUM. Linn.

For Gen. Char. see letter press to Pl. clxxxi.

1. Dialium ovoideum, *Thw.*—For description, &c. see Pl. clxxxi.

TRIBE—BAUHINIEÆ.

BAUHINIA. Linn.

For Gen. Char. see letter press to Pl. clxxxii.

1. Bauhinia racemosa, *Lam.*—For description, &c. see Pl. clxxxii.

2. Bauhinia Malabarica, *Roxb.*—A large tree, leaves 9 nerved transversely broad-oval cordate at the base glabrous very glaucous beneath, 2½ to 4 inches long by 3½ to 5 broad, petioles 1¼-1½ inches long grandular at the apex and swollen, leaflets rounded at the apex 4-nerved, united considerably above the middle or near the apex, the connecting nerves ending in a bristle between the leaflets, racemes axillary corymbiform almost sessile, longer than the petiole, shorter than the leaves, pedicels 1 inch long bracteoled at the base and again below the middle, calyx funnel shaped regular, 5 cleft pubescent, corol regular, petals spathulate, stamens 10 all fertile very slightly monadelphous at their base, alternate ones shorter, ovary pubescent; legume long stalked linear slightly falcate, at length glabrous marked longitudinally with waved reticulating lines. *Roxb. Fl. Ind.* ii. *p.* 321.

This tree grows to a large size, it is common in all our western coast forests from South Canara down to Cape Comorin, in the Godavery forests, and in Mysore (Balarangams, 3500 feet), it ascends the mountains to nearly 4000 feet; in South Canara it is called Cheppura, and in the Godavery forests Puli shinta; the wood is hard and very serviceable but scarcely known.

3. Bauhinia variegata, *Linn.*—A good sized tree, leaves roundish cordate or rounded at the base upper side glabrous, under when young shortly and softly villous afterwards glabrous, leaflets oval obtuse united far above the middle, nearly parallel 5-nerved, racemes axillary and terminal, calyx spathaceous ovate slightly acuminated 5-toothed at the apex, petals oblong nearly sessile, the upper somewhat larger and on a rather longer claw than the others, fertile stamens 5 with sometimes the rudiments of 1-5 abortive filaments all shortly united at the base, ovary with its stalk free from the calyx tube, legume straight linear acuminated compressed glabrous 5-12 seeded, seeds approximated. *WA. Prod. p.* 296. B. variegata et candida, *Roxb. Fl. Ind.* ii. *p.* 318, 19.

This tree is indigenous in many of our jungles, and is also extensively planted for ornamental purposes in gardens, &c.; it is very rapid in its growth, and grows most readily from the stool, so it would be an excellent tree to plant for fuel purposes; the wood is strong and serviceable.

4. Bauhinia purpurea, *L.*—A large tree, leaves roundish cordate at the base coriaceous glabrous, leaflets oval obtuse parallel united to the middle or a little above it, the free portions sometimes overlapping each other 4-5 nerved, racemes terminal panicled, calyx usually cleft to the base of the limb into 2 reflexed segments, the one emarginate, the other 3 toothed sometimes all cohering at the apex and spathaceous, petals oblong lanceolate attenuated at the base, fertile stamens 3 (or 4) long ascending, inner verticel large thick and slightly fimbriated on the edge, ovary stalk cohering on one side with the tube of the calyx, legume long linear pointed with 6-12 rather distant seeds. *WA. Prod. p.* 296.

This ornamental tree is found both in the jungles on the eastern and western side of the Presidency, and is cultivated in gardens; it is called Kanchan in Teligu, Pedda àre in Tamil, and Sarul in Canarese; the wood is strong and serviceable, and much in use for ploughs, &c. with the natives.

5. Bauhinia tomentosa, *Linn.*—A shrub or occasionally a small tree 18-20 feet high, branchlets, petioles, peduncles, calyx, legume and under surface of the leaves shortly and softly villous, leaves roundish at the base, leaflets oval obtuse parallel united to above the middle 3 nerved, stipules setaceous, peduncles leaf opposed usually 2 flowered, pedicels each with 3 bracteas at the base, calyx spathaceous ovate shortly acuminated 5 toothed, petals oval, stamens 10 all fertile and united at the base ascending, upper ones gradually shorter, legume flat lanceolate 5-6 seeded. *WA. Prod. p.* 295;—*Roxb. Fl. Ind.* ii. *p.* 323.

A shrub or small tree very common on the hills on the eastern side of this Presidency, rarer on the western side, it is very showy, and is much cultivated in gardens and about native temples, &c., the flowers are yellow with a deep purple eye; it is called Kanchini both in Tamil and Teligu, and in Hindostani Kachnar; its wood is very tough, and the heart often quite black.

6. BAUHINIA RETUSA, *Roxb.*—A small or middling sized tree, leaves roundish reniform from 2 lobed to scarcely emarginate with a bristle in the notch 3-5 inches each way, leaflets 3-5 nerved smooth on both sides, united to nearly the apex, panicles terminal and axillary composed of many corymbiform racemes, slightly villous, flowers numerous small pale yellow spotted with purple, filaments 3 fertile, inner verticle with several unequal staminodia, legume linear oblong with a round apex flat smooth 6 inches long by 2 broad, seeds 4-8 obovate much compressed smooth dark brown.

This tree I have only seen in the Godavery forests and Bustar country, it grows in the Calcutta Botanical Gardens.

7. BAUHINIA VAHLII, *WA.*; 8. BAUHINIA BENTHAMI, *Bedd.*; and 9. BAUHINIA ANGUINA rank amongst our largest forest creepers, and are very destructive to trees.

TRIBE—AMHERSTIEÆ.

HUMBOLDTIA.

For Gen. Char. see letter-press to Pl. clxxxiii.

1. HUMBOLDTIA UNIJUGA, *Bedd.*—For description, &c. see Pl. clxxxiii.

2. HUMBOLDTIA BRUNONIS, *Wall.*—A small tree, branchlets solid, leaves 6-8 inches long, leaflets 2 pair cuneate oblong, with a rather sudden acumination which is obtuse and mucronulate at the apex, glabrous on both sides except the costa and primary veins beneath, 4-6 inches long by 1½-2 broad, lower lobe of the stipules at right angles with the stem rounded at both ends, upper lobe erect narrow acute 6-8 lines long, racemes axillary pubescent about 6 inches long, pedicels about 6 lines long, solitary or twin and furnished at their base with an ovate bract on the common peduncle, bibracteolate at the apex below the calyx, flowers pinkish white, petals 3 about 6 lines long, stamens 5 nearly twice as long as the petals. *Wight Icones tab.* 1606;—(*bad as regards the raceme.*)

A small or middling sized tree very common in Coorg and South Canara, but also extending all down our western forests.

3. HUMBOLDTIA LAURIFOLIA, *Vahl.*—A small tree, branchlets tumid, joints fistulose, leaves about 1 foot long, leaflets 3-5 pair (generally 5) ovate to oblong with a sudden long finely pointed acumination, glabrous on both sides and prominently reticulated, 4-6 inches long by 1¾-2¼ broad, lower lobe of the stipules small, rounded at both ends, somewhat reflexed 5-6 lines across, nearly equal-sided, upper lobe more or less erect ovate to lanceolate acute about 1½ inches long, racemes axillary 4-6 inches long rufo-pubescent, pedicels about 3 lines long furnished at the base with ovate obtuse reflexed bracts on the common peduncle, bibracteolate at the apex, petals 5, stamens much exserted, ovary hairy. *Wight Icones* 1605.

Very common in the Ambagamowa and Ratnapoora districts in Ceylon, on banks of streams; called Gal-karanda.

4. HUMBOLDTIA VAHLIANA, *Wight.*—Branches solid equal, leaflets 4 pair ovate oblong acuminate, back lobe of the stipules nearly equal sided rounded at both ends, petals 5 nearly equal scarcely equalling the calyx lobes caducous. *Wight Icones tab.* 1607-8.

Nilgiri hills, in jungles about Coonoor; I have not met with this species.

There is a species of Humboldtia growing to a very large tree most abundant in S. Travancore on the banks of rivers and streams in the jungles about Colatoorpolay, but I have not yet procured it in flower or fruit; the branchlets are solid, the common petiole is prominently winged, leaves above a foot long, the leaflets lanceolate up to 9 inches long by about 2 broad; the stipules with the lower lobe transversely reniform, 1 inch broad transversely, and ¾ inch long vertically, upper lobe obliquely ovate unequal sided suberect 1¼ inches long by nearly 1 inch broad, generally more or less overlapped by the lower lobe, the 2 lobes subequal in size or the upper lobe sometimes considerably larger. This is perhaps the same as No. 3, or it may turn out to be a new species; I hope to figure it when perfect specimens are procured.

TAMARINDUS. LINN.

For Gen. Char. see letter press to Pl. clxxxiv.

1. TAMARINDUS INDICA, *L.*—For description, &c. see Pl. clxxxiv.

SARACA. LINN.

For Gen. Char. see letter press to Pl. lvii.

1. SARACA INDICA, *L.*—For description, &c. see Pl. lvii.

CRUDIA. SCHREB.

For Gen. Char. see letter-press to Pl. of Crudia Zeylanica.

1. CRUDIA ZEYLANICA, *Thw.*—For description, &c. see plate of this tree.

TRIBE—CYNOMETREÆ.

HARDWICKIA. ROXB.

For Gen. Char. see letter-press to Pl. xxvi.

1. HARDWICKIA BINATA, *Roxb.*—For description, &c. see Pl. xxvi.

2. HARDWICKIA PINNATA, *Roxb.*—For description, &c. see plate of this tree.

CYNOMETRA LINN.

For Gen. Char. see letter press to plate of Cynometra ramiflora.

1. CYNOMETRA RAMIFLORA, *Linn.*—For description, &c. see plate of this tree.

SUB ORDER—MIMOSEÆ.

Flowers 5-(rarely 3-4 or 6-) merous, small regular sessile in spikes or heads or very rarely shortly pedicellate often polygamous, sepals valvate often united, petals valvate (rarely slightly imbricate in genera not Indian,) often united, stamens equal to or double the number of the petals or indefinite, seeds usually flattened with a hard shining testa, albumen none or very scanty, radicle of the embryo short and straight, leaves bipinnate (pinnate in the American genus Inga.)

TRIBE—ADENANTHEREÆ.

ADENANTHERA, LINN.

For Gen. Char. see letter press to Pl. xlvi.

1. ADENANTHERA PAVONINA. *L.*—For description, &c. see Pl. xlvi.

2. ADENANTHERA BICOLOR, *Moon.*—A middling sized tree 15-20 feet high, branches terete glabrous shining reddish black, petiole tumid at the base, subsulcate and minutely glandulose above, stipules very minute subulate, leaves bipinnate glabrous 8-10 inches long, pinnæ distant 1-3-opposite or subopposite pair, 6-8 foliate, leaflets alternate ovate to ovato-lanceolate minutely apiculate, shining above, opaque beneath, costa and veins reddish, 1-1½ inches long by 6-9 lines broad, petiolules tumid 1 line long, racemes axillary many flowered much shorter than the leaves slightly pilose, peduncles 1½ lines long articulated below the middle 1 bracteolate at the base, flowers glabrous red 1 line long, calyx minute acutely 5-toothed, petals lanceolate, the staminal gland white, the pollen yellow, ovary stipitate about 10 ovuled, legume linear much contorted 5-6 lines broad, seed roundish compressed shining scarlet with the apical half black, funicle 2 lines long. *Thw. En. Pl. Zey. p.* 98.

This tree is not uncommon in the southern part of Ceylon at no great elevation; it is called Mas-mora by the Singhalese.

PROSOPIS. LINN.

For Gen. Char. see letter-press to Pl. lvi.

1. PROSOPIS SPICIGERA, *Linn.*—For description, &c. see Pl. lvi.

DICHROSTACHYS. DC.

For Gen. Char. see letter-press to Pl. clxxxv.

1. DICHROSTACHYS CINEREA, *DC.*—For description, &c. see Pl. clxxxv.

XYLIA. BENTH.

For Gen. Char. see letter press to Pl. clxxxvi.

1. XYLIA DOLABRIFORMIS, *Benth.*—For description, &c. see Pl. clxxxvi.

Leucœna glauca is a small introduced tree now common in our gardens.

TRIBE—ACACIEÆ.

ACACIA. WILLD.

For Gen. Char. see letter-press to Pl. xlvii.

1. ACACIA ARABICA, *Willd.*—For description, &c. see Pl. xlvii.

2. ACACIA LEUCOPHLEA, *Willd.*—For description, &c. see Pl. xlviii.

3. ACACIA CATECHU, *Willd.*—For description, &c. see Pl. xlix.

4. ACACIA SUNDRA, *Roxb.*—For description, &c. see Pl. l.

5. ACACIA FERRUGINEA, *Willd.*—For description, &c. see Pl. li.

6. ACACIA FARNESIANA, *Willd.*—For description, &c. see Pl. lii.

7. ACACIA PLANIFRONS, *WA.*—A tree of no great height, armed, branches crowded at the summit, spreading in all directions and forming a flat umbrella-like top, thorns stipulary short conical and curved, leaves bipinnate 1-1¼ inches long, pinnæ 5-10 (generally about 6) pair, leaflets 10-16 pair very small linear obtuse glabrous, petioles glandless compressed and angled, somewhat ciliate when young and terminated at the apex by a subulate process, peduncles axillary aggregated a little shorter than the leaves, glabrous furnished with 2 ovate boat-shaped imbricate bracteoles a little above the base, heads of flowers globose, corol 5 cleft, legume turnid somewhat terete spirally twisted forming a circle about 1¼ inches in diameter. *WA. Prod. p.* 276.

This tree, known as the "Umbrella-thorn" is very common in the southern parts of this Presidency; in some parts of Madura and Tinnevelly it forms jungles to the exclusion of every other tree. It is a most valuable fuel tree, and the Forest Department have commenced plantations of it in Tinnevelly to meet the demand for locomotive fuel; the wood is very strong and serviceable, and in general use for agricultural instruments and many other purposes. WA. describe the tree as having long subulate thorns besides the short recurved ones, but none of my species show this; the tree is called Sále in Teligu.

8. ACACIA TOMENTOSA, *Willd.*—A small or middling sized tree, armed, branches terete, spines stipulary spreading, often very large and hard, young shoots, petioles and peduncles clothed with yellowish tomentum, leaves bipinnate about 4 inches long, pinnæ 10-12 pair with an oblong gland below the lowest and an umbilicate one between each of the 1-2 last pair, leaflets 20-30 pair linear obtuse pubescent, peduncles axillary 1-4 together furnished about the middle with 4 small bracteoles, heads of flowers globose, corol 5 cleft, stigma dilated, legume 6-8 inches long flat thin linear-falcate, 6-10 seeded. *WA. Prod. p.* 276;—*Roxb. Fl. Ind.* ii. *p.* 558.

This small tree is found sparingly throughout this Presidency, in the north of Ceylon, and in Bengal; it is used for fuel purposes.

8. ACACIA LATRONUM, *Linn.*—Generally a shrub only, sometimes a small tree, thorns white numerous stipulary united at the base often dreadfully large and tapering into a very fine sharp point, inwardly hollow, leaves bipinnate 1-1½ inches long, pinnæ 3-5 pair ½-¾ inch long with a gland on the petiole, leaflets 6-15 pair very small narrow linear obtuse glabrous and without any glands between the pairs, spikes of flowers axillary about 2 inches long usually in pairs, peduncled, cylindric, many flowered, corol 4-5 cleft, legume flat thickish oval-falcate, 3-4 seeded. *WA. Prod. p.* 273;—*Roxb. Fl. Ind.* ii. 559.

This most formidable plant often covers large arid tracts in this Presidency to the exclusion of all other trees, generally in the form of a shrub, but sometimes it becomes a small tree; its flowers are pure white turning to yellow, and are very fragrant; it is used for fuel.

10. ACACIA EBURNEA, *Willd.*—A shrub or sometimes a small tree, the young branches, petioles and peduncles covered with sticky scales, armed, leaves bipinnate, about 1¼ inches long, pinnæ 2-4 pair rather distant with a concave gland between the last pair, leaflets 5-8 pair oval oblong obtuse glabrous slightly distant from each other, thorns stipulary united at the base, small (sometimes very large ?) peduncles axillary several together bracteated about the middle, heads of flowers globose small, corol 5 cleft, legumes narrow elongate twisted.

Found in various jungles in this Presidency and in Ceylon, abundant in the Salem district, is used for fuel, seldom more than a shrub.

11. ACACIA ROXBURGHII, *WA.*—A shrub, glabrous, armed, leaves bipinnate, pinnæ 6 pair approximated, leaflets 9 pair closely approximated and almost imbricate, thorns stipulary often longer than the leaves united at the base, heads of flowers axillary globose, legumes linear variously bent. *WA. Prod. p.* 276. Mimosa eburnea, *Roxb. Fl. Ind.* ii. *p.* 558.

Found in jungles on the eastern coast (this I have not met with.)

12. ACACIA PINNATA, 13. CONCINNA, 41. CŒSIA, and 15. INTSIA all described in Wight's and Arnot's Prodromous, are large thorny climbers and hedge plants, concinna is called Chikai, and a considerable trade is carried on in its saponaceous legumes.

Roxburgh's Acacia suma is the tree I figure as A. catechu; it has always a very white bark. Most of the catechu collected in this Presidency comes from Acacia sundra.

A very great number of Australian Acacias have been introduced on to our hill ranges and they grow remarkably well and rapidly; they chiefly belong to the section which only produce true leaves when very young the apparent leaves being only phylloids (or leaf stalks). Ootacamund and other places on the Nilgiris, Pulneys, &c. are now overgrown with Acacia melanoxylon (a phylloid Acacia) and A. dealbata (a bipinnate Acacia), both introductions from Australia; they are both most valuable for fuel; the former is a very good timber being the blackwood of Australia, the latter spreads to an immense extent by its suckers and unfits all ground near it for any other cultivation, it should only be planted as a screen against the monsoons, or where a firewood jungle is required, and should be excluded from gardens and general plantations.

TRIBE—INGEÆ.

ALBIZZIA. Durazzini.

For Gen. Char. see letter-press to Pl. liii.

1. Albizzia Lebbek, *Willd.*—For description, &c. see Pl. liii.

2. Albizzia odoratissima, *Willd.*—For description, &c. see Pl. liv.

3. Albizzia stipulata, *DC.*—For description, &c. see Pl. lv.

4. Albizzia amara, *Willd.*—For description, &c. see Pl. lxi.

5. Albizzia Wightii, *Grah.*—An unarmed tree, branches terete, young shoots nearly or quite glabrous, leaves bipinnate, pinnæ 9-10 pair with a gland on the petiole below the lowest pair, and between the uppermost pair, leaflets 15-25 pair oblong linear obtuse glabrous, glaucous on the under side, petioles pubescent, stipules subulate, peduncles solitary axillary bearing a capitate head of flowers, legumes thin broadly linear about 6-seeded. *WA. Prod. p.* 274. Mimosa pulchella, *Roxb. Fl. Ind.* ii. *p.* 548.

A tree found in Malabar and the southern provinces; it is nearly allied to Albizzia amara, but differs in its solitary peduncles never forming a terminal raceme, and it is more glabrous.

6. Albizzia procera, *Willd.*—An immense tree, unarmed, nearly glabrous except the young parts, branches terete, leaves bipinnate, pinnæ 3-5 pair with a large gland on the petiole near its base, leaflets 6-12 pair obliquely oval pointed glabrous, panicles axillary or terminal and very large, heads of flowers globular peduncled aggregated, legume thin flat straight linear-lanceolate pointed 8-12 seeded. *Roxb. Fl. Ind.* ii. *p.* 548;—*WA. Prod. p.* 275.

This is a magnificent tree very general throughout the forests of this Presidency, both on the eastern and western side, its wood is very similar to that of A. speciosa, and is much used for building purposes, &c.; it is called Konda Vaghe (Tamil), and other names, signifying that it is the hill or jungle A. Lebbek.

A. lophantha, an Australian tree, has become quite naturalized on the Nilgiris.

PITHECOLOBIUM. Mart.

For Gen. Char. see letter-press to Pl. clxxxviii.

1. Pithecolobium dulce, *Willd.*—For description, &c. see Pl. clxxxviii.

2. Pithecolobium Anamallayanum, *Bedd.*—For description, &c. see Pl. clxxxix.

3. Pithecolobium subcoriaceum, *Thw.*—A large tree, unarmed, 30-40 feet high, the slightly angled branchlets, the petioles, panicles and under surface of the leaflets fusco-puberulous, pinnæ 2-3 pair, leaflets 15-20 pair subcoriaceous linear oblong very unequal sided at the base, 2-7 lines long 1½-2 lines broad, paler beneath; glands large 1 or 2 on the petiole below the pinnæ, and 1 between each pair of pinnæ; heads 3-12 flowered, flowers puberulous, pale green 1-bracteolate, corol more than twice as long as the 5-toothed tubular calyx, stamens very much exserted, ovary on a long stipe pubescent, legume puberulous spirally twisted, about 6-seeded.

A tree not uncommon on the Ceylon mountains 4000-6000 feet elevation, called Meemini by the Singhalese.

4. Pithecolobium bigeminum, *Willd.*—A good sized tree, unarmed, leaves bipinnate or conjugate-pinnate, 1-1½ feet long with 1 or 2 large glands on the petiole below the pinnæ, pinnæ 1-2 pair 9-10 inches long, with a gland between each pair, leaflets 2-4 pair with a gland between each pair, ovate to lanceolate with a blunt mucronulate acumination, glabrous, very unequal at the base, shining above, 4-4½ inches long by 1½-2 broad, petioles 2 lines long, racemes panicled terminal many flowered, flowers in small globose heads, legume spirally twisted yellow red within, seeds oblong 7 lines long by 5 lines broad, testa black shining membranaceous, funicle slender 2 lines long.—Inga bigemina, *WA. Prod. p.* 269. Mimosa lucida, *Roxb. Fl. Ind.* ii. *p.* 544;—*Rheede Mal.* vi. *t.* 12.

A common tree in the western forests of the Madras Presidency up to 4000 feet (very abundant in Wynad), also in Ceylon and in N. E. Bengal; in Ceylon it is called Calateya.

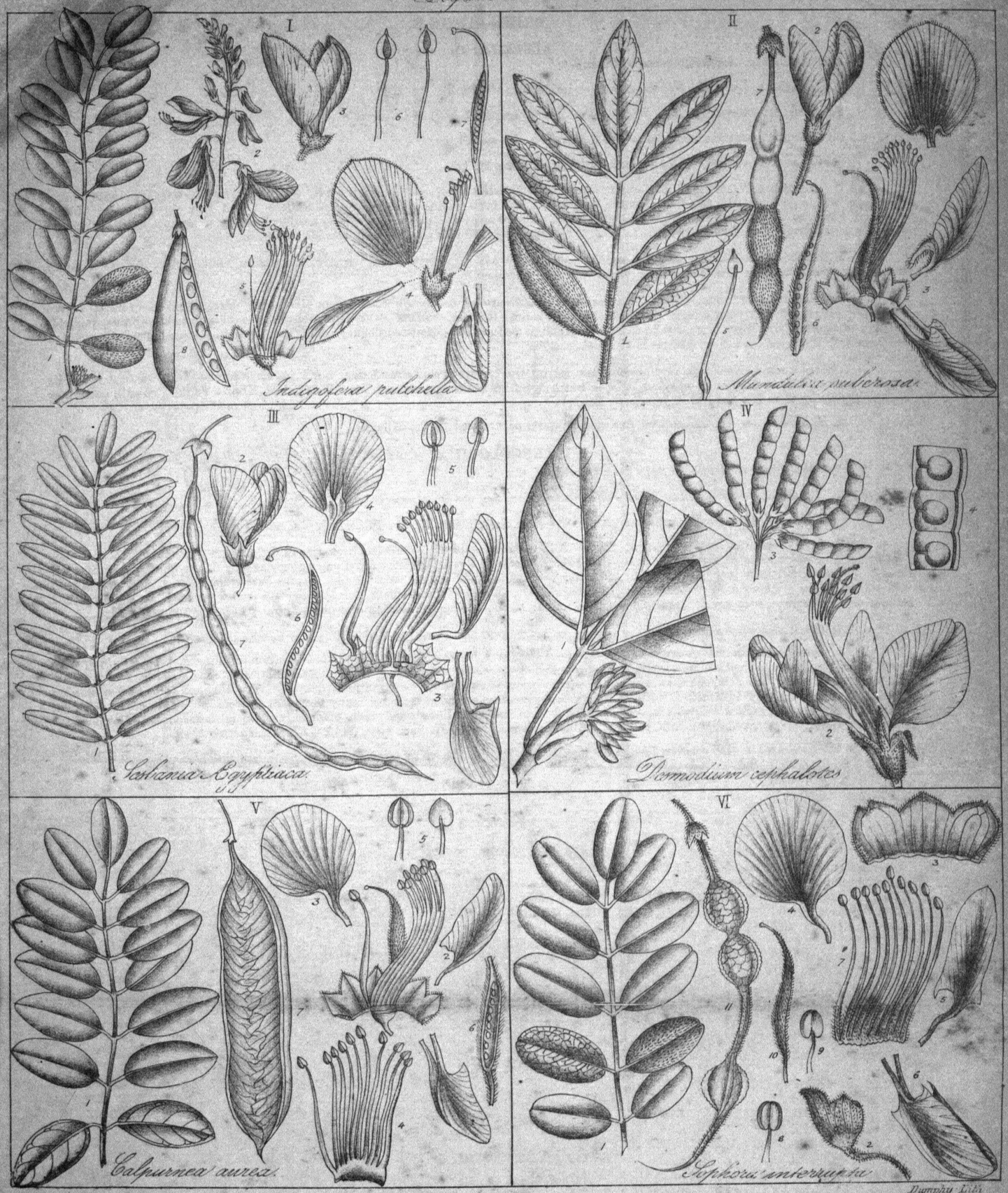
5. Pithecolobium umbellatum, *Willd.*—A small tree, armed, thorns stipulary or often solitary large diverging leaf and flower bearing; leaves bipinnate, pinnæ 1-2 pairs with a gland between each pair, leaflets 3-10 pair with an odd one on the outside below the lowest pair glabrous, linear oblong, obtuse sessile with an inconspicuous gland between each pair, the uppermost pair obovate, peduncles axillary slender 1-2 together bearing a single globular head of few short pedicelled flowers, stamens very long, legumes large many flowered much curved woody slightly scabrous at length shining. *Willd. Sp.* 4. *p.* 1027;—*WA. Prod.* 270. Mimosa concordiana, *Roxb. Fl. Ind.* ii. *p.* 556.

Common on the eastern side of the Madras Presidency, also in the north of Ceylon.

6. Pithecolobium geminatum, *Kœn.*—A shrub or small tree 8-12 feet high, branches simple pubescent filiform flexuose with stipulary spreading spines, leaves conjugately pinnate with a gland between the pinnæ; leaflets 3-5 pair with an odd one on the outside below the pairs, oblong obovate unequal at the base glabrous, without glands between the pairs, petioles pubescent, flowers capitate, heads small globose few flowered on axillary slender peduncles.—Mimosa geminata, *Kœn.* Inga geminata, *WA. Prod. p.* 269.

Ceylon, and the southern part of the Peninsula.

Leguminosæ.



Dunphy Lith.

DIALIUM OVOIDEUM. (Nat. ord. Leguminosæ.)

DIALIUM. *Linn.*—GEN. CHAR. Calyx tube very short, segments 5 much imbricate herbaceous or petaloid, petals 0 or 1-2 small, stamens 2 rarely 3 free, filaments short, anthers oblong erect affixed at the base, cells dehiscing longitudinally, ovary sessile at the bottom of the calyx, or on a stipe adnate to the calyx tube, 2-ovuled, style short subulate, stigma terminal small, legume ovato-orbicular, slightly compressed or ovoid-globose indehiscent, exocarp hard or fragile, endocarp generally pulpy. Seed 1, more or less compressed albuminous, cotyledons flat foliaceous or slightly fleshy, radicle short straight subincluded. Trees unarmed, leaves unequally pinnate, leaflets few generally alternate coriaceous, or submembranaceous, stipules small or inconspicuous, flowers small in axillary or terminal cymose panicles, bractes and bracteoles deciduous.—Codarium, *Soland.* Arouna, *Aubl.*

DIALIUM OVOIDEUM. (Thw.) A very large tree, leaflets 5 lanceolate, retuse at the apex, glabrous above, sparingly and very minutely puberulous beneath, 2-3 inches long ¾-1¼ broad, petiolule tumid 2 lines long, panicles terminal adpressedly incano-pilose longer than the leaves, bracteoles lanceolate soon deciduous, flowers white about 3 lines long a little longer than the pedicels, sepals ovate-lanceolate, petals none, anthers extrorse, ovary sessile on an inconspicuous ring-like disk, stigma obtuse, legume ovoid dark brown velutinous sparingly compressed subsessile, 7-8 lines long by 5-6 lines broad, seeds 1-2 roundish compressed striated shining yellowish or reddish-brown, 4 lines long. *Thw. En. Pl. Zeyl. p.* 97.

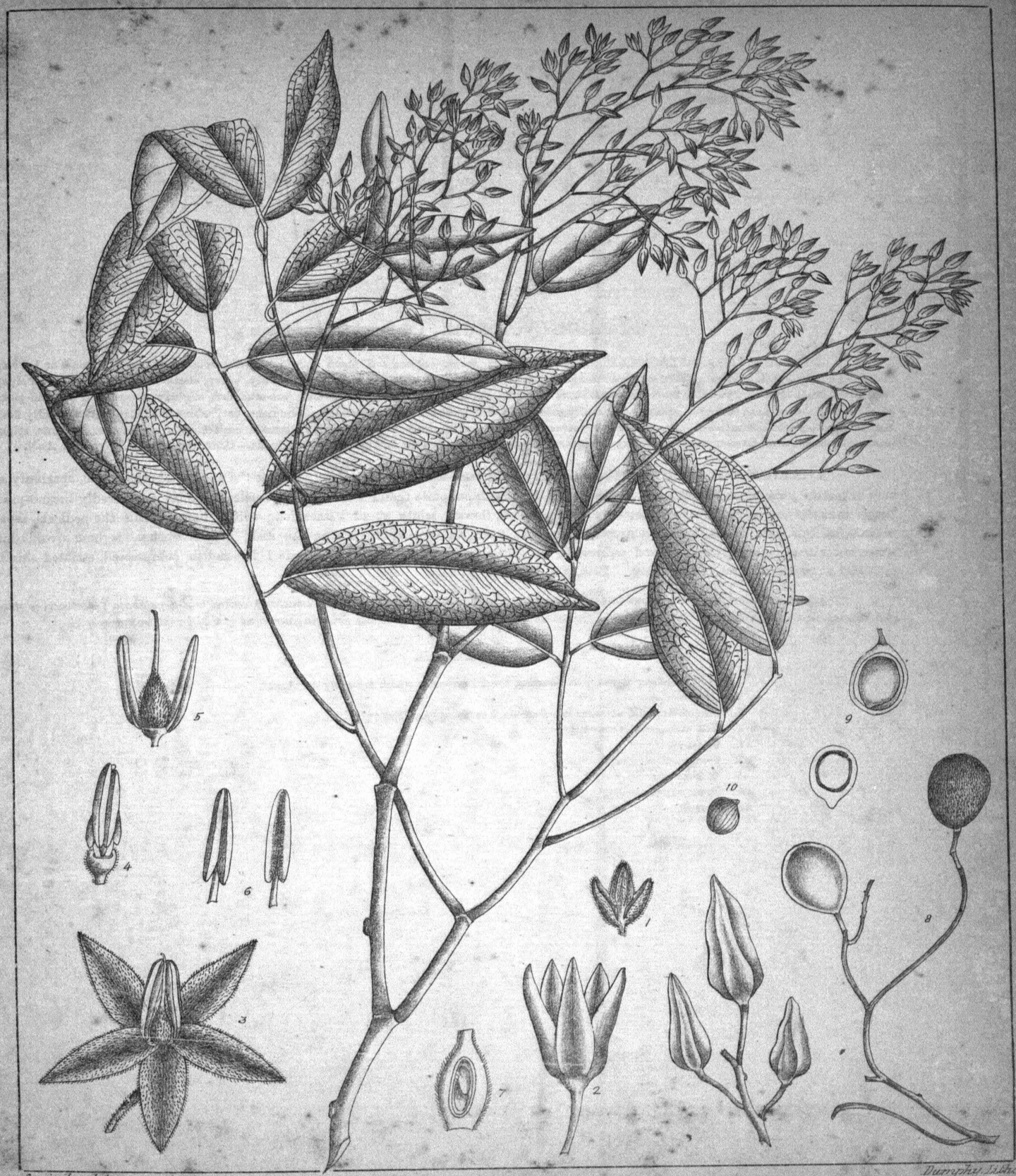
A valuable timber tree, only found in Ceylon (districts north of Kandy, at no great elevation), called Gal-Seyembala ; the wood is strong and handsome, and well adapted for ornamental furniture ; the fruit has an agreeable acid flavour, and is sold in the bazaars.

Analysis.

1. A very young flower-bud, showing the 2 bracteoles which are early deciduous.
2. A flower.
3. The same open, showing the 5 sepals, 2 stamens, and the ovary.

4 & 5. The same, sepals removed.

6. Anthers.
7. Ovary cut vertically.
8. A fruit branch.
9. Fruit cut vertically.
10. A seed.



Govindar del.

Murphy lith.

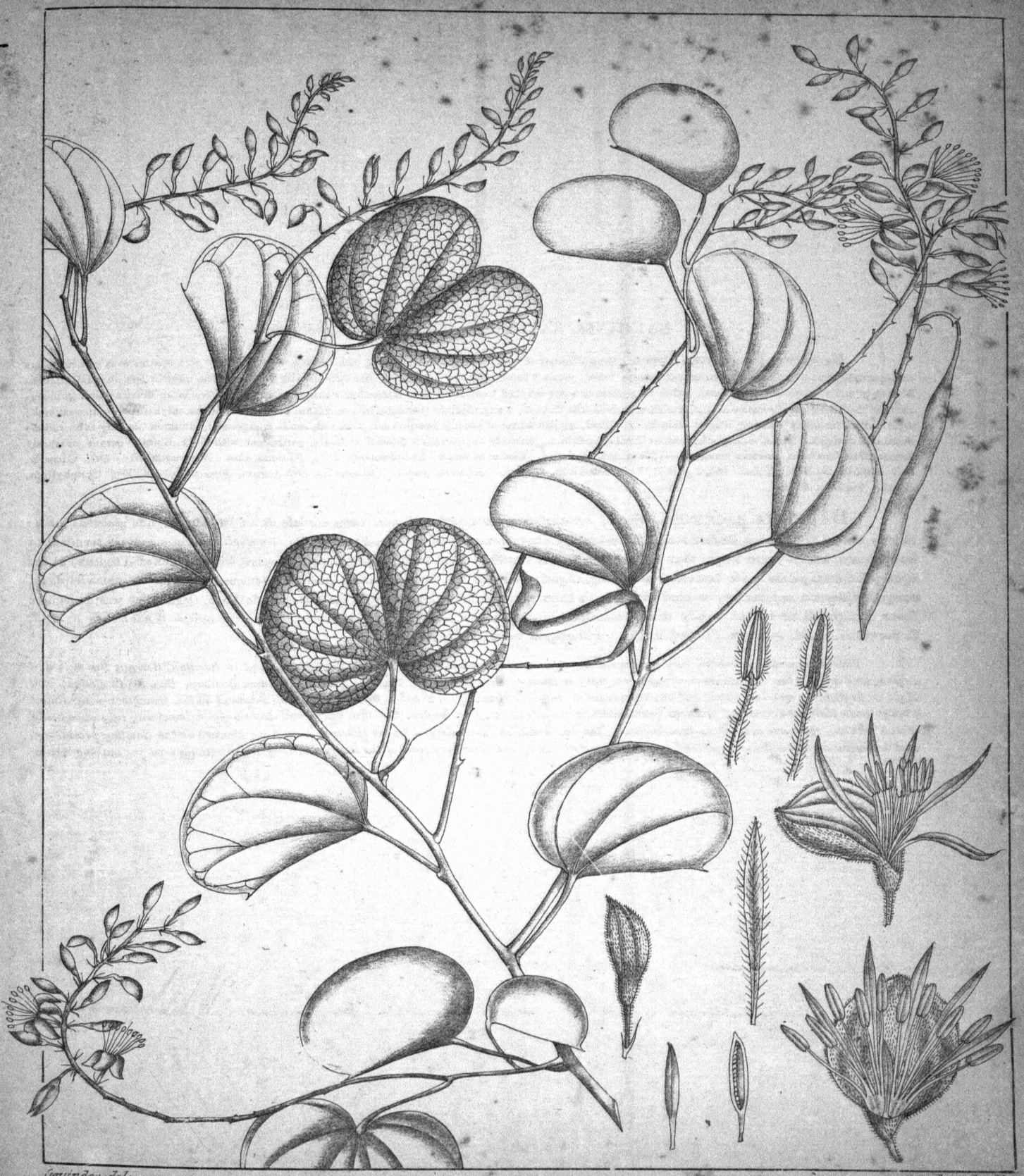
Pudium ovoideum, Thw.

BAUHINIA RACEMOSA. (Nat. order Leguminosæ.)

BAUHINIA. *Linn.*—GEN. CHAR. Sepals united at the base in a short or long disk-bearing tube, the free part spathaceous and subentire or separating into 5 or fewer valvate or induplicate lobes, petals 5 inserted at the summit of the tube usually clawed often more or less unequal, stamens 10 free or more or less monadelphous, either all perfect or some reduced to staminodia or altogether wanting, sometimes there is an inner verticil (prolongation of the torus) nearly entire or cut into short bristle-like threads, ovary stipitate the stipe free or adnate to one side of the calyx-tube, ovules several; style filiform or rarely wanting, stigma capitate or dilated, legume linear or oblong compressed, 2 valved, seeds compressed, albumen usually thin, radicle short and straight. Trees, woody climbers or shrubs, leaflets 2, generally united into a 2-lobed or nearly entire leaf with 5-11 digitate nerves or rarely distinct from the base, racemes terminal.—Piliostigma, *Hochstett.* Phanera, *Lour.* Symphyopoda, *DC.* Pauletia, *Cav.* Amaria, *Mutis in DC.* Casparia, *DC.* Lasiobenia, *Mig. Fl. Ind. Bat.* i. *part* i. 71. Adenolobus, *Harvey.* Schnella, *Raddi.* Caulotretus, *DC.* Lacara, *Spreng.* Tylotia, *Vog.* Lysiphyllum, *Benth.* Perlebia, *Mart.*

BAUHINIA RACEMOSA. (Lam.) A small tree, bark dark scabrous, leaves cordate at the base, upper side glabrous, under shortly villous or glabrous, leaflets roundish or broadly obovate, united to or beyond the middle 3-nerved, racemes solitary terminal or leaf opposed, leafless much longer than the leaves; flowers scattered small whitish, calyx spathaceous at length reflexed 5 toothed at the apex pubescent, petals linear lanceolate ascending, slightly hairy on the outside, rather unequal, stamens 10 all fertile, monadelphous, unequal, filaments and anthers bearded with longish hairs, ovary glabrous long stalked, stalk free, style none, stigma flat sessile, legume linear straightish or curved woody thick scarcely dehiscing, many seeded. *Lam. Encycl. Meth.* i. *p.* 390;—*WA. Prod. p.* 295. B. parviflora, *Vahl.*;—*Roxb. Fl. Ind.* ii. 323. Piliostigma racemosa, *Hoch.*

This is generally a crooked very ramous tree; it is very common throughout this Presidency, and in Bombay, Bengal, Burmah and Ceylon, and ascends the mountains to about 3,000 feet; it is called Aree in Teligu, Archee in Tamil, Aupta in Bombay, Ban raj in Bengal, and Mylà in Ceylon; the wood is small, but the heart-wood is very hard and fine, a cubic foot weighs when seasoned 44 lbs. Matchlock-men almost always make their slow matches from its bark, which is boiled, dried, and beaten, and then burns well and slowly, without any substance being mixed with it; ropes are also made from the bark; the tree is said to be worshipped by the Hindoos during the Dussera in the Bombay presidency, and is sometimes called Wunà rajah (King of the jungle). Elephants are very fond of the leaves and they are sometimes used for making native cigars.



Govindoo. del.

Murphy Lith.

Bauhinia racemosa. (Lam.)

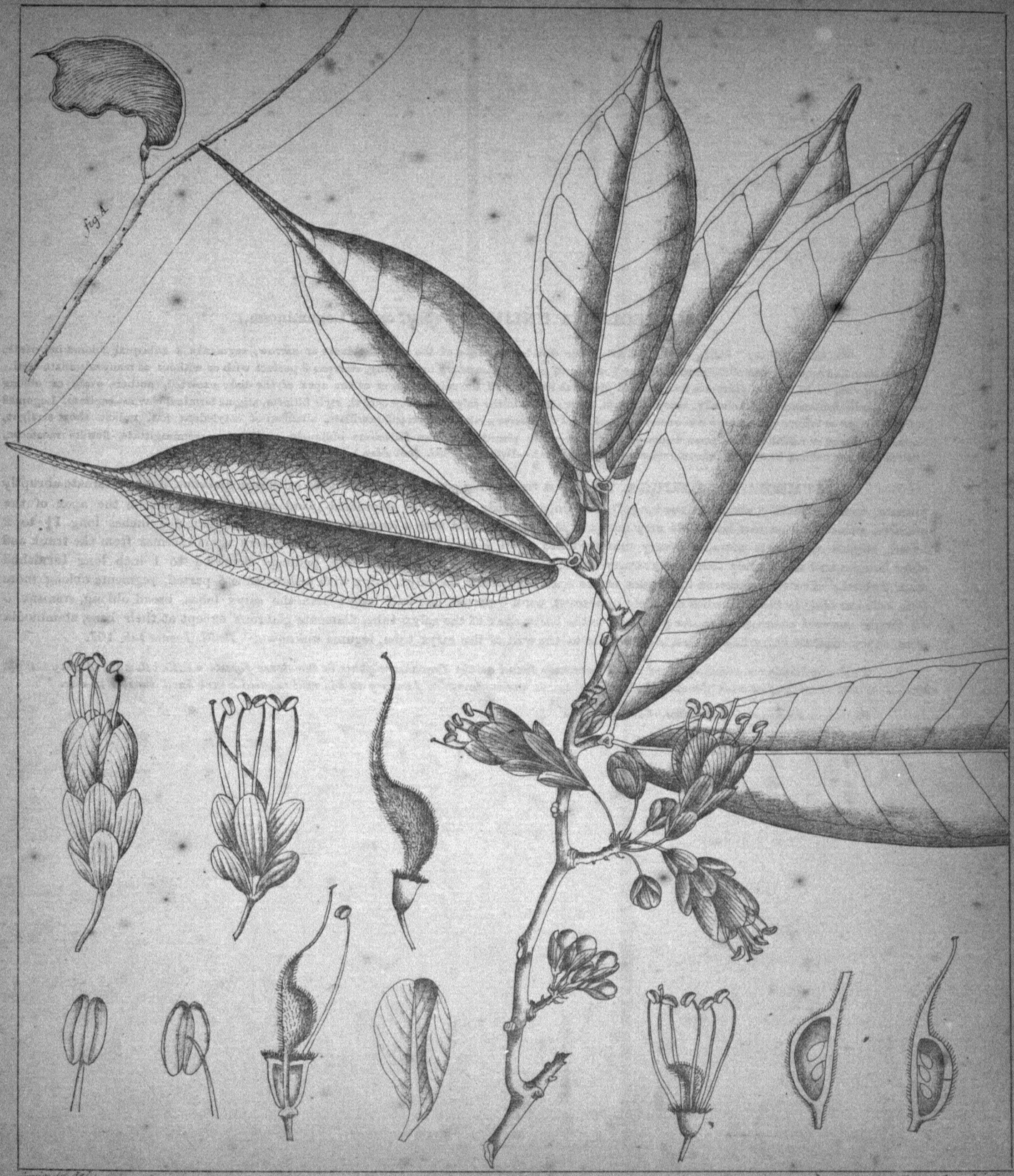
HUMBOLDTIA UNIJUGA. (Nat. order Leguminosæ.)

HUMBOLDTIA. *Vahl.*—GEN. CHAR. The disk-bearing tube of the calyx turbinate or narrow, segments 4 subequal colored imbricate, petals either 5 subequal sessile oblong imbricate, or 3 subequal, and 2 rudimentary or wanting, stamens 5 perfect with or without as many alternate teeth-like staminodes, or 10 perfect, filaments free inserted either at the base of the calyx tube or at the apex of the disk, exserted, anthers ovate or oblong versatile, cells dehiscing longitudinally, ovary stipitate, stipe adnate to the calyx tube, few ovuled, style filiform, stigma terminal clavato-capitate. Legumes oblong oblique or falcate compressed coriaceous 2-valved, seed transverse ovate compressed exarillate, albumen of cotyledons flat, radicle short straight, included. Large or middling sized trees unarmed, leaves abruptly pinnate, stipules foliaceous obliquely reniform or semisagittate, flowers racemose, bractes ovate or oblong, bracteoles colored enclosing the flower bud.—Batschia, *Vahl.* (not *Linn.*)

HUMBOLDTIA UNIJUGA. (Bedd.) A tree, young parts minutely strigose otherwise glabrous, leaves alternate abruptly pinnate, common petioles about 2 lines long, leaflets only one pair with a flat depressed gland at their insertion on the apex of the petioles, sub-sessile narrow-lanceolate very unequal at the base, and with a long acumination at the apex, 5-7 inches long 1¼ to 2 broad, stipule semi-ovate acuminate very unequal sided about ¼ inch long, flowers crimson on very short racemes from the trunk and older boughs and more rarely from the younger branchlets, peduncles ½ to 1 inch long, pedicels slender ½ to 1 inch long furnished with 2 oblong minutely pubescent bracteoles at the apex just below the calyx, calyx with a short tube 5 parted, segments oblong more than twice as long as the bracteoles minutely pubescent, corol 5 parted, one half longer than the calyx lobes, broad oblong, stamens 5 all fertile inserted alternate with the petals on to the hairy apex of the calyx tube, filaments glabrous except at their base, staminodia none, ovary stipitate hairy 2-3 ovuled, stipe adnate to the wall of the calyx tube, legume unknown. *Bedd. Icones tab.* 107.

This very handsome middling sized tree I have only found on the Travancore ghats in the dense forests a little below the Attraymallay, 3000-4000 *feet elevation, but most abundant in that locality ; it was in flower in January and is said to yield a very hard durable timber.*

Fig. A in the plate is the legume of H. Brunonis.



Humboldtia unijuga (Bedd.)

TAMARINDUS INDICUS. (Nat. order Leguminosæ.)

TAMARINDUS. *Linn.*—GEN. CHAR. Sepals 4, united at the base into a turbinate tube, the free portion or segments much imbricate. Petals 3, the lateral ones ovate, the upper inner one narrower, concave. Stamens incurved, united in a sheath to the middle, 3 or rarely 2 only perfect, with ovate anthers, 4 or 5 others reduced to short teeth. Ovary stipitate, with several ovules; style inflexed, rather thick, with a truncate stigma. Pod linear or oblong-linear, curved thick, but slightly compressed, the epicarp crustaceous and fragile, the mesocarp pulpy, the endocarp thick and fleshy, forming complete partitions between the seeds. Seeds broadly ovate, flattened; testa rather thick; albumen none, embryo straight, with a short radicle.—Trees. Leaves abruptly pinnate. Flowers in terminal racemes.

TAMARINDUS INDICUS. (Linn.) A very large tree, with a beautiful spreading head, leaves about 4-5 inches long by 1-1½ inches broad glabrous but pale or glaucous, leaflets 10-20 pairs oblong-linear obtuse unequal-sided at the base ½-¾ inch long by about 3 lines broad, petiolules generally hairy, stipules small deciduous, racemes short and loose, really terminal but usually in very short branchlets so as to appear lateral and shorter than the leaves, flowers cream colored or yellowish, blotched with crimson, about 1 inch in diameter, bracts very deciduous, calyx segments about 4 lines long, petals rather longer, pod about 1 inch broad varying in length according to the number of seeds ripened, usually 2 or 3. *DC.* ii. 488;—*Benth. Fl. Aust.* ii. *p.* 294. T. occidentalis, *Gœrtn.* T. officinalis, *Hook.*

This tree, the only species of the genus, is common both wild and cultivated throughout Tropical Asia and also in Africa and Australia, and cultivated in the West Indies, it is perhaps our finest tree for avenue and tope purposes, but its slow growth is somewhat against it; its fruit yields a considerable revenue in some districts, the heart wood is generally of small diameter, very hard close grained and sometimes beautifully veined of a dark-reddish color and hard to be worked, unseasoned it weighs 92-98 lbs. the cubic foot, and when seasoned 79 lbs. and its specific gravity is 1·264, it is much used for turnery purposes and for pestles, oil presses, sugar crushers, carpenter's mallets and planes, croquet mallet heads and balls, and many other purposes, and is one of the best fuels for brick kilns as it burns whilst green; and is esteemed as excellent for gunpowder charcoal, the heart wood is only procurable from very old trees; the sap wood is of a dirty white color not durable and if not seasoned in water gets worm eaten. The leaves, fruit and seed are used medicinally by the natives, and a dye is prepared from the leaves, a paste made of the seeds reduced to fine powder and boiled with thin glue forms one of the strongest wood cements. The tree is called Amli in Hindustanee, Chinta in Telugu, Pooli in Tamil, Seyembalu in Ceylon, and Mà-gyi in Birmah, it attains a girth of 25 feet but has never any great length of trunk.

Swainson del.

Tamarindus Indicus, (Linn.)

DICHROSTACHYS CINEREA. (Nat. order Leguminosæ.)

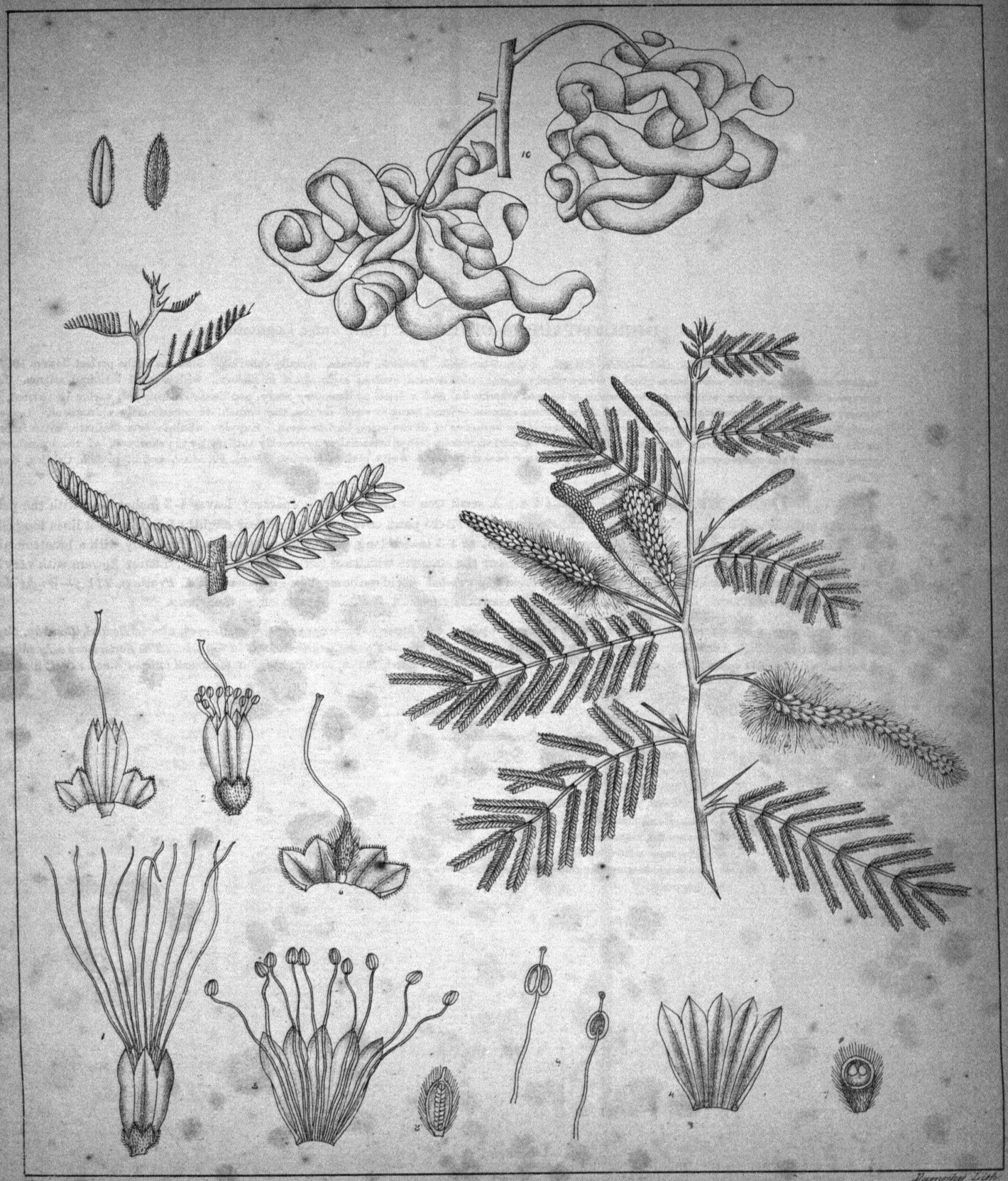
DICHROSTACHYS. *DC.*—GEN. CHAR. Calyx 5-toothed. Petals 5, valvate, usually cohering. Stamens in the perfect flowers 10, free; anthers ovate, tipped with a deciduous gland. Ovary nearly sessile, with several ovules; style short or filiform, with a small terminal stigma. Lower flowers of the spike neuter, with long, linear white or colored staminodia, and a small rudimentary ovary, pod linear compressed, variously twisted, indehiscent or the valves irregularly separating from the persistent sutures.—Small trees or rigid shrubs, the branchlets occasionally spinescent. Leaves abruptly bipinnate, with a stipitate gland between the pinnæ of the lowest or of all the pairs, leaflets small. Stipules subulate or acuminate, often imbricate on the short flowering branches. Flowers sessile, in dense cylindrical spikes, either terminal or apparently axillary by the shortness of the branchlet; the upper flowers of the spike hermaphrodite and yellow, the lower ones neuter and white pink or purple. *Benth. Fl. Aust. vol.* ii. *p.* 299. Caillies, *Guill. et Perr.*

DICHROSTACHYS CINEREA. (WA.) A small tree or large shrub, spinescent, leaves 1-3 inches long with the petiole generally pubescent, pinnæ 8-12 pair ½ to 1 inch long, leaflets 12-20 pairs crowded oblong-linear slightly falcate 1 to 2 lines long ciliated and often hairy, spikes solitary or 2-3 together pedunculate 1-3 inches long, peduncle pubescent and generally with a bracteole about the middle, hermathrodite, flowers about 1 line long without the stamens which are twice or thrice as long, neuter flowers with very long staminodia, legume 2-3 inches long 3-4 lines wide, irregularly twisted viscid-pubescent or glabrous. *WA. Prod. p.* 271 ;—*Wight Icones tab.* 357. Mimosa cinerea, *Roxb. Fl. Ind.* ii. 561. Desmanthus cinereus, *Willd.* Acacia cinerea, *Spreng.*

A very common tree or shrub in dry arid soils in the plains and lower hills throughout the presidency, also in Bengal, Bombay, Ceylon, the Archipelago and N. Australia ; it is called Vadatalla in Tamil, Velturu in Telugu, and Andara in Ceylon. The flowers are very showy, the upper half of the spike being yellow, the lower rose colored ; the wood is very hard, tough and strong, but too small to be of much use, it makes good tent pegs.

Analysis.

1. A neuter flower shewing the long staminodia.
2. A fertile flower.
3. The same, calyx opened, stamens removed.
4. A corol opened.
5. Corol and the 10 free stamens.
6. Ovary and style.
7. Ovary cut transversely.
8. The same cut vertically.
9. Anthers shewing the glandular tips (which are deciduous) all much magnified.
10. Legumes.



Dumphey Lith.

Dichrostachys cinerea. (DC.)

BENGAL SECRETARIAT
LIBRARY.

XYLIA DOLABRIFORMIS. (Nat. order Leguminosæ.)

XYLIA. *Benth.*—GEN. CHAR. Flowers 5-merous sessile generally hermathrodite, calyx tubuloso-campanulate dentate, petals quite free to the base, slightly imbricate at the side in the centre. Stamens 10 alternately a little shorter, free, exserted, anthers oblongo-orbicular, gland-tipped at the apex (from the connective at the back) glands deciduous, pollen-grains numerous, ovary sessile many-ovuled, style filiform, stigma terminal small, legume sessile broadly falcate, flatly compressed thick woody 2-valved, partitioned between the seeds inside ; seed transverse obovate compressed, funicle short fleshy. A large tree unarmed, leaves bipinnate, pinnæ 1-occasionally 2-pair, leaflets large few paired, glands between the pinnæ and leaflets, and on the petiole below the pinnæ, stipules small linear deciduous, capitula globose, peduncles axillary sub-fasciculate, or racemose at the apex of the branches, flowers small yellowish or cream colored. *Benth. in Hook Journ. Bot.* iv. 417.

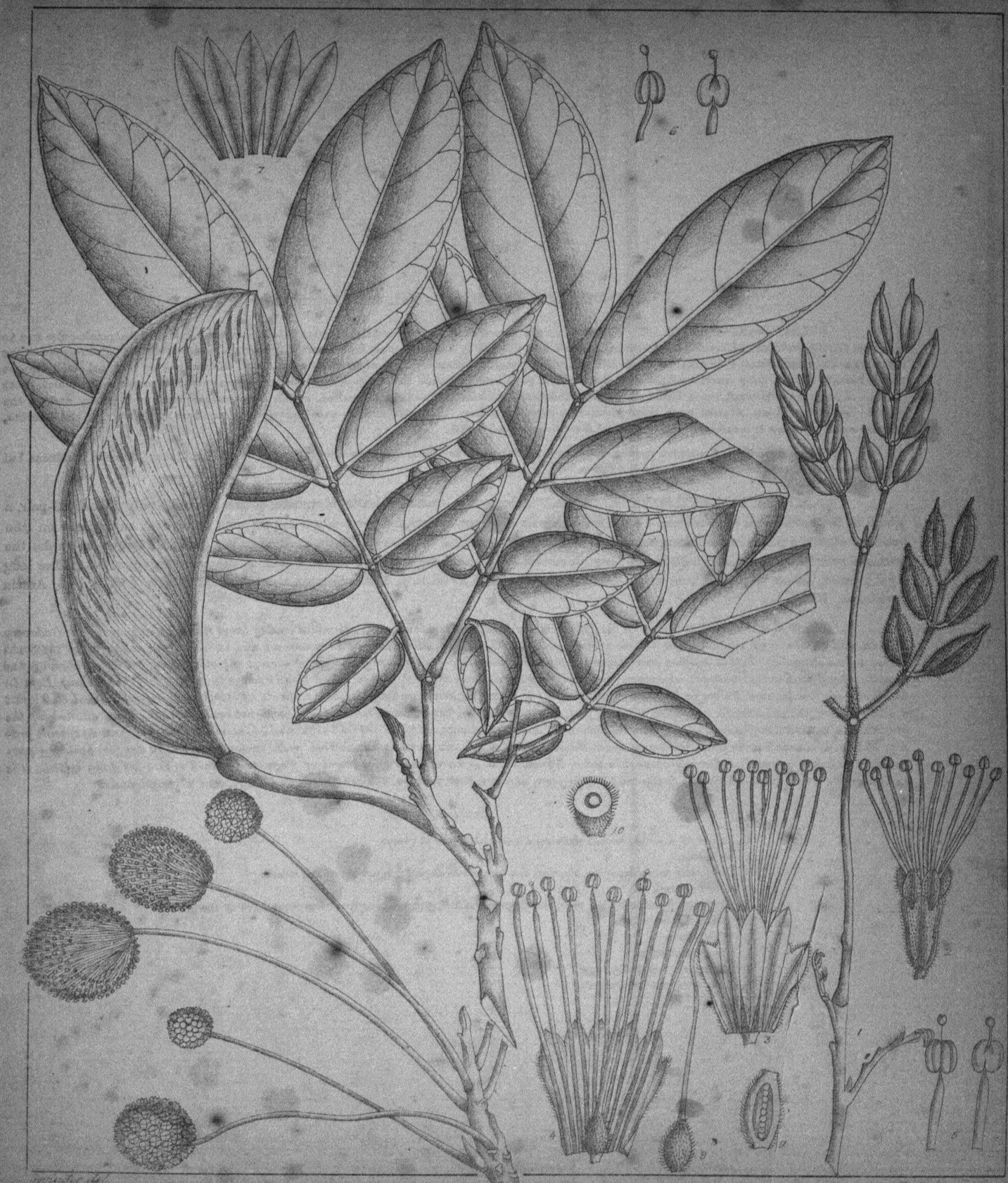
A genus consisting of a single species, the long stalked glands to the anthers are always present in the bud, they are soon deciduous but can be detected on some of the anthers in the full flower.

XYLIA DOLABRIFORMIS. (Benth.) A large tree, unarmed, leaves bipinnate, pinnæ generally only 1-rarely 2-pair, a gland on the petiole near the base and 1 between each pair of pinnæ, leaflets 2-6 (generally 3-4) pair with or without an odd one on the outside below the pairs, ovate-oblong acute with a gland on the petiole between each pair, the leaflets are gradually larger upwards, the terminal pair being sometimes 9-10 inches long, peduncles 3-4 inches long, capitula about 1 inch in diameter, legumes 4-6 inc hes long $1\frac{1}{2}$-$1\frac{3}{4}$ broad, valves very thick and woody.—Inga xylocarpa, *DC. Prod.* ii. *p.* 439. Mimosa xylocarpa, *Roxb. Fl. Ind.* ii. 543. Acacia xylocarpa, *Willd.*

This tree is widely distributed in the forests of the Madras Presidency, it is abundant and of large size in some parts of the Godavery forests, and on the lower western slopes of the mountains in South Canara, Malabar and Travancore ; and in the forests at the foot of the South Canara and Malabar ghats it is often very gregarious forming forests of itself to the exclusion of almost all other trees, but it is seldom of fine growth when found in this state ; it is generally known by its Tamil name of Irool, and is called Konda tangedu in Teligu (the Circars), Boja in the Godavery forests, and Tiwa in Canorese (S. Canara); it flowers in March and April when destitute of leaves, and ripens its seed in August and September, the wood is of a very dark red color fading to dark brown, heavy, hard, close grained, and not easily worked, when planed up the surface has an unctuous feel and not very agreeable smell. A cubic foot unseasoned weighs 68-74 lbs. and 58 lbs. when seasoned and its specific gravity is ·928, it is excellent for posts, railway sleepers, naves of wheels, and all purposes demanding great strength, and is in use for building purposes. This tree is found in Birmah where it is called Pynkado and is known as the ironwood of Pegu and is said to last as long as teak, it is used there for knees in ship building, house and bridge posts, ploughs, boat anchors, the construction of carts, and other purposes.

Analysis.

1. Apex of a young branch shewing a leaf with 2 pair of pinnæ.
2. A flower.
3. The same calyx cut open, shewing the free petals slightly imbricate at the sides.
4. Corol opened out.
5. Anthers, front and back view, shewing the stalked gland arising from the connective at the back.
6. Anthers from a bud.
7. The petals.
8. Ovary and style.
9. Ovary cut vertically.
10. The same cut transversely.



Ficus dendrophorus, Benth.

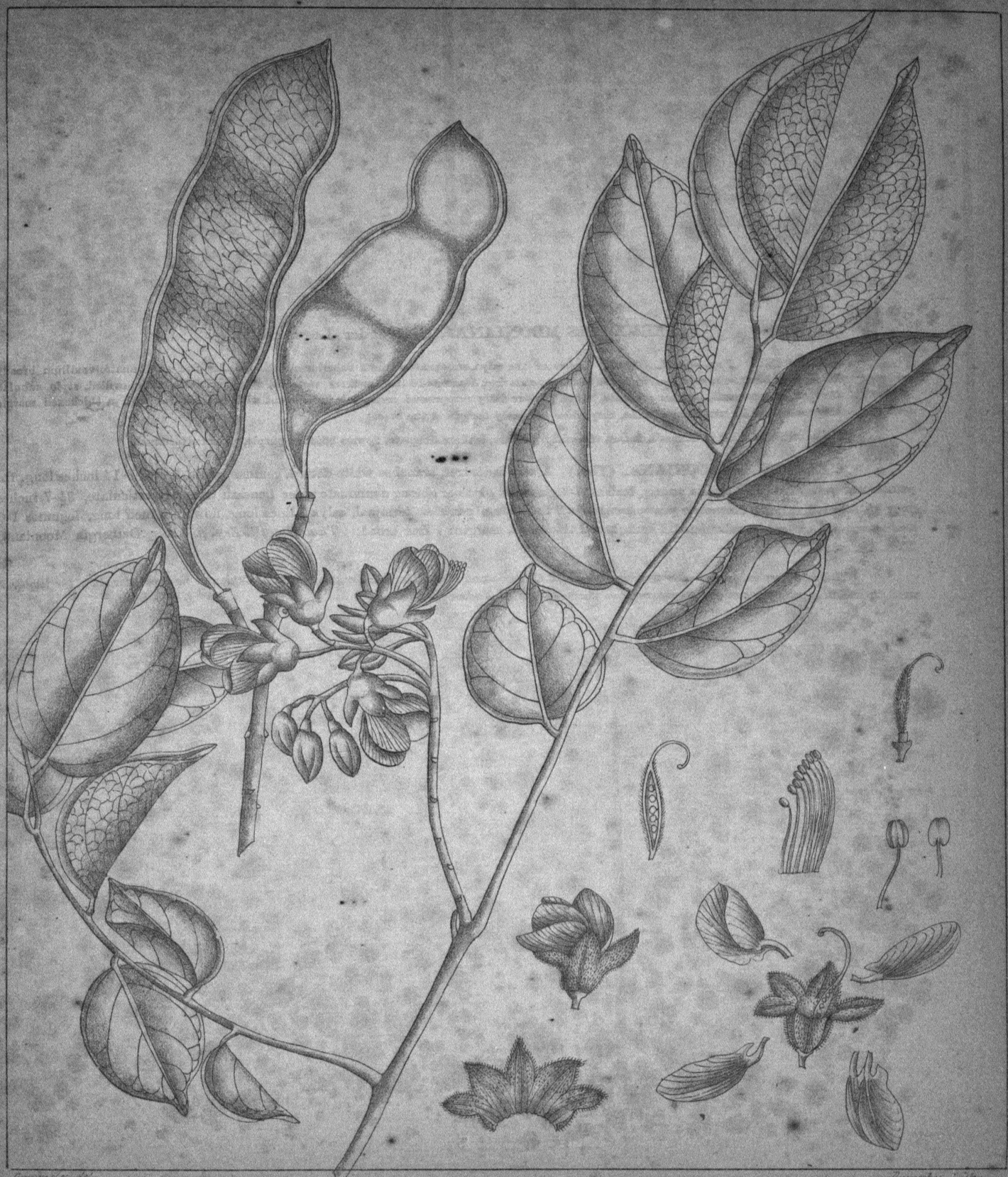
PERICOPSIS MOONIANA. (Nat. order Leguminosæ.)

PERICOPSIS. *Thw.*—GEN. CHAR. Lobes of the calyx subequal or the 2 superior a little smaller and subconnate, vexillum broadly orbicular reflexed, alæ falcato-obovate, keel incurved obtuse, petals free, stamens 10 free, anthers versatile, ovary stipitate many-ovuled, style subulate involute at the apex, stigma small, legume stipitate, broadly linear flatly compressed coriaceous indehiscent with the sutures with a thickened margin, seed much compressed broadly ovate or orbicular, cotyledons obliquely cordate at the base.

A tree with the habit of Ormosia, leaves unequally pinuate, leaflets alternate, flowers blackish-purple, panicles terminal.

PERICOPSIS MOONIANA. (Thw.) A very large tree, branches white-dotted, gemmœ pilose, leaves 8-14 inches long, the petiole and petiolules pilose when young, leaflets 5-8 glabrous ovate or oblong acuminate paler beneath minutely reticulate, 2½-7 inches long 1½-3 broad, stipules lanceolate pilose deciduous 2 lines long, panicles terminal, calyx 7 lines long, flowers 1 inch long, legumes 1-6 seeded smooth, obscurely reticulated, 1 inch broad thickened, margins 1 line broad. *Thw. En. Pl. Zey. p.* 413. Dalbergia Mooniana, *Thw. l. c. p.* 93.

This is a very valuable timber tree common about Colombo and the southern and central parts of Ceylon at no great elevation, the timber is used for building purposes and for furniture, and the tree is called Nadoong.



Gaudichaud del. Humphrys sculp.

Pueraria Mooniana (Wall.)

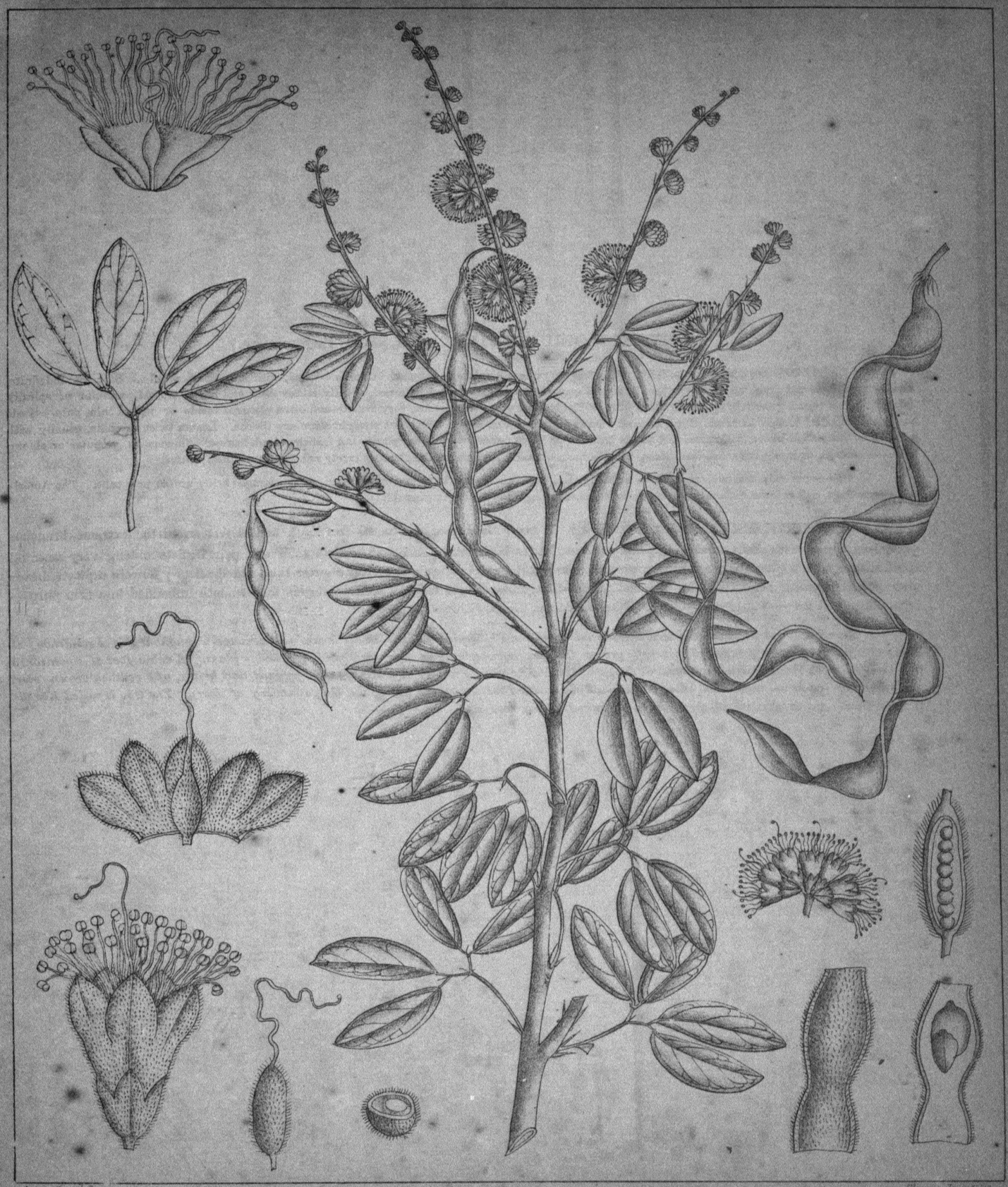
PITHECOLOBIUM DULCE. (Nat. order Leguminosæ.)

PITHECOLOBIUM. *Mart.*—GEN. CHAR. Calyx campanulate or tubular. Corolla 5-lobed, with a cylindrical tube. Stamens indefinite, usually numerous and long, united at the base in a tube enclosing the ovary. Pod flattened, usually rather thick and much curved, annular or spirally twisted, either opening entirely or on the outer edge in 2 valves, or quite indehiscent, very smooth and often coloured inside or with a thin pulp. Seeds ovate or orbicular; funicle filiform. Trees or rarely shrubs, unarmed or armed with short straight stipulary thorns. Leaves twice pinnate, usually with a gland on the petiole below the pinnæ, and others between or below some or all of the pinnæ and leaflets; leaflets few. Flowers in globular or oblong heads or umbels, or rarely in cylindrical spikes, usually hermaphrodite and white, the stamens rarely red. Cathormium, *Hassk.*

This genus only differs from Albizzia in its legume, from Acacia it is at once distinguished by the stamens being united in a tube. The American genus Inga differs from Pithecolobium only in its leaves being always simply pinnate.

PITHECOLOBIUM DULCE. (Willd.) A good sized tree up to 40 feet high and 6 feet in girth, extreme branches pendulous armed with short straight stipulary thorns, leaves bipinnate, pinnæ and leaflets each one pair, leaflets oblong very unequal sided obtuse with a gland between the pinnæ and between the pairs of leaflets, petiole shorter than the leaflets; flowers capitate, heads shortly pedunculate, racemose, the racemes panicled, legumes turgid twisted, seeds glabrous and smooth imbedded in a firm pulp.—Inga dulcis, *Willd*;—*WA. Prod. p.* 269. Mimosa dulcis, *Roxb. Fl. Ind.* ii. 556.

This tree is supposed to have been introduced from the Philippine Islands, but it is now most common throughout this Presidency; it is one of our best coppice fuels and is largely grown for that purpose and is also much used as a hedge plant. A cubic foot of unseasoned wood weighs 50·53 *lbs. and when seasoned* 40 *lbs., and its specific gravity is* ·640, *it is hard, coarse grained and brittle, of a reddish brown color, and when sawn emits an unpleasant odour; it is used for country carts, packing boxes, and the pannelling of doors. The tree is called Kàrkà-pilly in Tamil and is often called the Manilla tamarind by Europeans.*



Corrente, del.

Pithecolobium dulce. (Willd.)

PITHECOLOBIUM ANAMALLAYANUM. (Nat. order. Leguminosæ.)

For Gen. Char. see letter-press to Pl. clxxxviii.

PITHECOLOBIUM ANAMALLAYANUM. (Bedd.) A large spreading tree, branches panicles and petioles fusco-pubescent, young branches angled, leaves 4-9 inches long with 4-12 pair of pinnæ which are 3 to 4 inches in length, a large raised deeply concave gland is present on the petiole near its base on the upper side, and one smaller one in the centre of several of the interspaces between the insertion of the pairs of pinnæ (these latter generally occupy alternate interspaces), leaflets 10-22 pair subcoriaceous linear-oblong very oblique at the base and apex, glabrous above except on the margin, costa beneath furnished with longish hairs otherwise glabrous, panicles subcorymbiform terminal and several together in the upper axils, capitula many flowered, calyx and corol aureo-pubescent on the outside, the latter 3-4 times as long as the former, ovary on a long stipe pubescent.

This very beautiful tree with its large spreading head is very conspicuous in the moist woods on the higher ranges of the Anamallays (5000-8000 *feet,*) *and other hills to the south of them, but I never observed it on the Nilgiris or anywhere north of the Palghat gap; except in its much more numerous pinnæ, it is closely allied to P. subcoriaceum* (*Thw.*), *and I was inclined to refer it to that species, but Dr. Thwaites* (*to whom I have forwarded specimens*) *thinks it very distinct.*

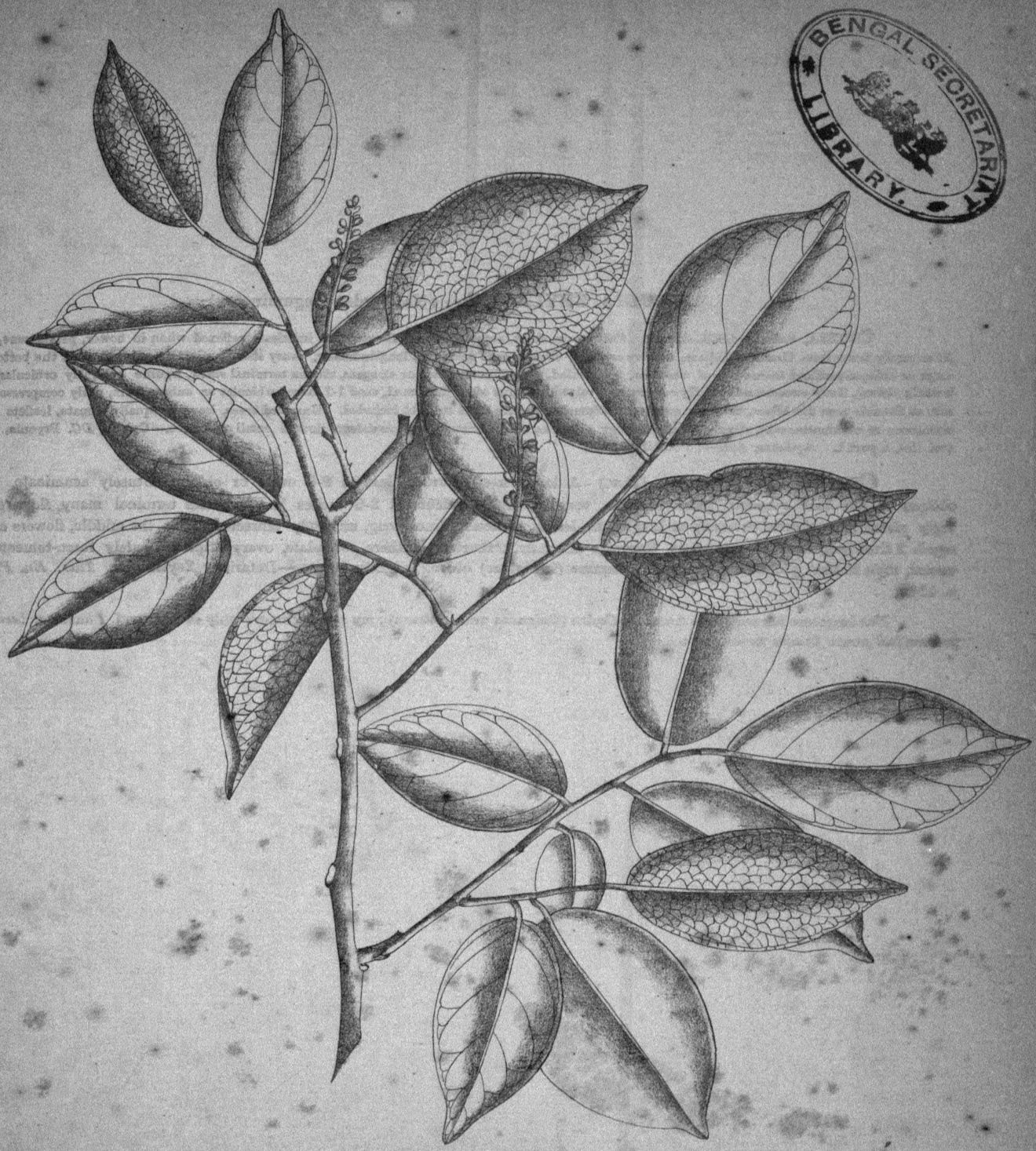
Pithecolobium Arcamallagianum (Benth.)

CRUDIA ZEYLANICA. (Nat. order Leguminosæ.)

CRUDIA, *Schreb.*—GEN. CHAR. Calyx tube short, segments 4 membranaceous imbricate reflexed when in flower, petals none, stamens 10 or rarely fewer free, filaments filiform, anthers ovate or oblong, cells dehiscing longitudinally, ovary shortly stipitate, stipe free at the bottom of the calyx or obliquely affixed to one side of the tube, few ovuled, style filiform short or elongate, stigma terminal small, legume obliquely orbicular, ovate or broadly oblong, flatly compressed, rigidly coriaceous 2-valved, margins often thickened, seed 1-2 large orbicular or subreniform, flatly compressed emarginate at the side near the hilum, albumen none, cotyledons flat, radicle short straight included. Unarmed trees, leaves unequally pinnate, leaflets alternate coriaceous or membranaceous, stipules small and very caducous, or foliaceous and persistent, flowers small racemose.—Crudia, *DC.* Pryonia, *Mig. Fl. Ind. Bot.* i. *part* 1. Apalatoa, *Aubl*—? Tonchiroa, *Aubl.*

CRUDIA ZEYLANICA. (Thw.) A large tree, glabrous, leaflets 2-6 ovate or oblong obtusely acuminate, slightly oblique at the base rounded, paler beneath, very minutely reticulated 2-6 inches long, racemes terminal many flowered sparingly pilose, from shorter to nearly as long as the leaves, pedicels 2 lines long, minutely bibracteolate at the middle, flowers crowded, sepals 2 lines long rounded persistent, filaments alternately shorter ; anthers rotundate, ovary stipitate, palely fusco-tomentose, 3-4 ovuled, style filiform glabrous, stigma small, legume (immature) oblong slightly falcate.—Detarium Zeylanicum, *Thw. En. Pl. Zeyl. p.* 414.

This large tree has only been found in Ceylon (Galpaata near Caltura) ; my specimens are only in bud, and I have not been able to procure full grown flowers for analysis.



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Sowerby del. Murphy Lith.

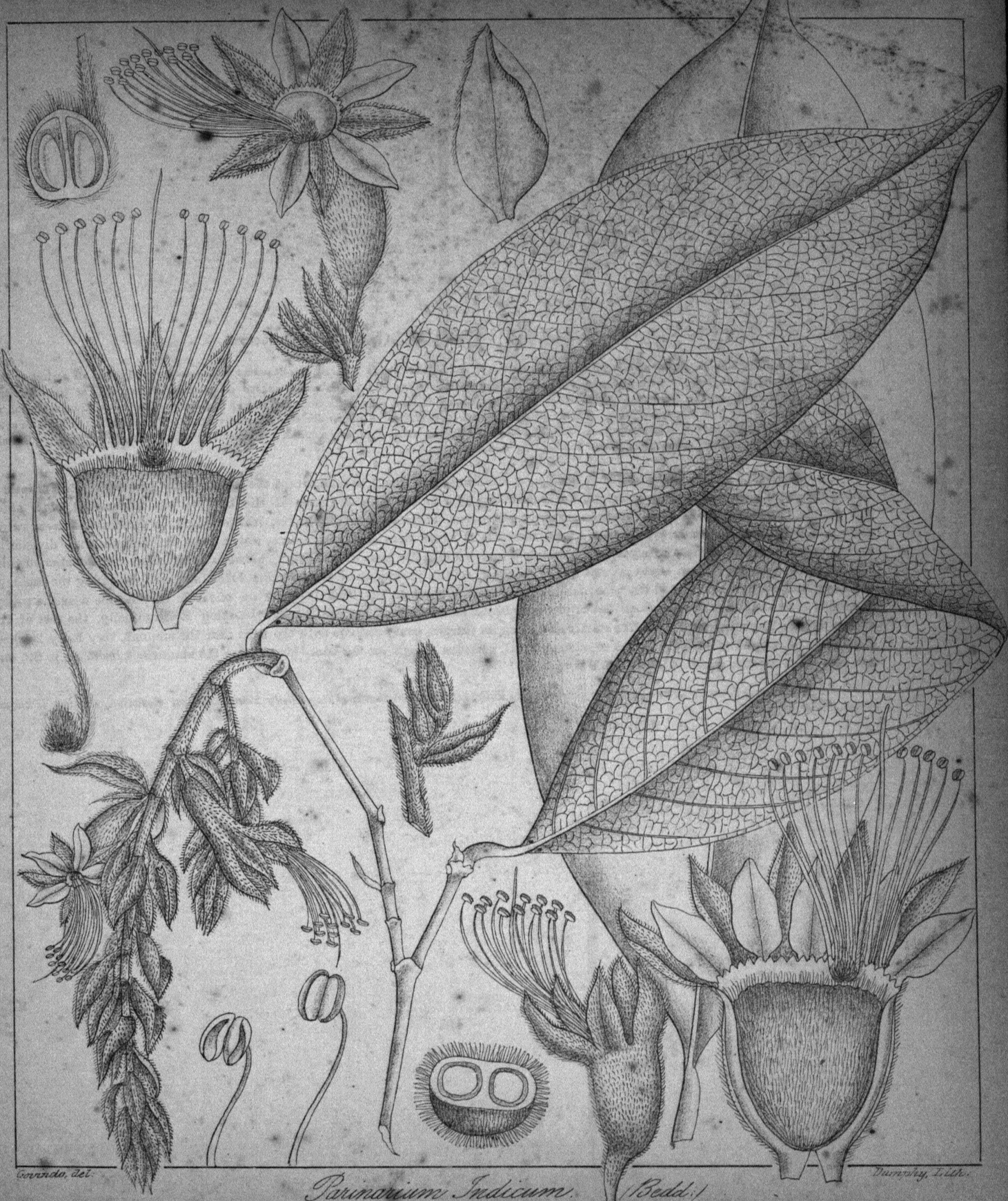
Cradia Zeylanica (Thw.)

PARINARIUM INDICUM. (Nat. order Rosaceæ.)

PARINARIUM. *Juss.*—GEN. CHAR. Calyx-lobes 5, imbricate. Petals 5, rarely 4. Stamens numerous or rarely few, all perfect or those on one side reduced to small staminodia, filaments filiform; anthers small. Ovary of a single carpel, adnate on one side to the mouth of the calyx-tube and protruding from it, more or less completely 2-celled, with 1 erect ovule in each cell; style from the base of the ovary. Drupe ovoid or spherical, the endocarp bony. Seeds 1 or 2, erect.—Trees. Leaves alternate, coriaceous, entire. Stipules deciduous, usually small. Flowers white or pink, in cymes forming terminal raceme-like or corymbose panicles. *Benth. Fl. Aust.* ii. *p.* 426. Petrocarya, *Jack.* Grymania, *Presl.* Maranthes, *Blume.* Exitelia, *Blume.* Lepidocarya, *Karth.* Balantium, *Desv.* Entosiphon, *Bedd.*

PARINARIUM INDICUM. (Bedd.) A middling sized tree, glabrous except the inflorescence, leaves alternate elliptic to lanceolate entire glabrous, slightly undulate, 8-9 inches long by 3 broad, with 2 glands at the base on the under side close above the petiole, petiole ¼ to ½ inch, racemes slightly pubescent, shorter than the leaves, leaf opposed or terminal, flowers white subsessile 3 bracteated, outer bract large ovato-lanceolate 2 inner ones linear-lanceolate, calyx tube infundibuliform, divisions 5 imbricate lanceolate acuminate subequal pilose, petals 5 inserted into the jaws of the calyx, between its divisions and the stamen tube, and alternate with the former, ovate pointed imbricate equal, a little shorter than the calycine lobes, stamen-tube lining the inside of the calyx and connate with it to its base densely hairy inside, stamens 12-15 all together on one side of the tube near the ovary, filaments glabrous, twice the length of the calyx induplicate in æstivation, anthers 2-celled bursting longitudinally, the rest of the stamen tube is furnished with teeth-like staminodia along its margin, ovary connate with the tube near the summit, very hairy 2-celled, cells 1-ovuled, ovules erect, style lateral or almost basal, glabrous except at the base, longer than the stamens. *Bedd. Ic. p.* 22, *and tab.* cix. Entosiphon, *Bedd. in Mad. Lit. Journ.*

I have only found this tree on the Wynad slopes (Malabar), Carcoor ghat and its vicinity 2000-3000 *feet elevation, nothing is known of its timber or uses.*



Gonindu, del. Dunsky, Lith.

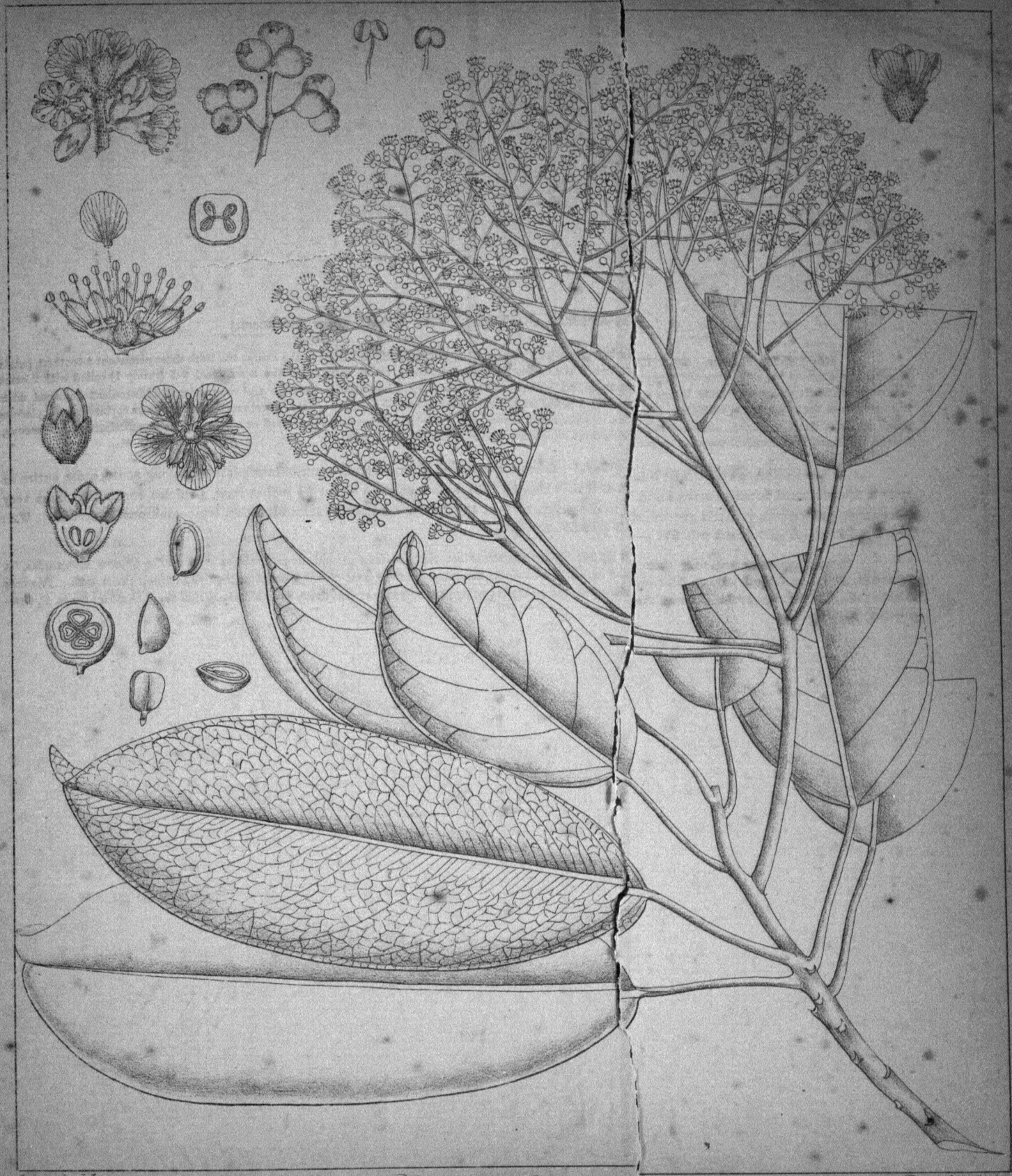
Parinarium Indicum. (Bedd.)

PHOTINIA NOTONIANA. (Nat. order Rosaceæ.)

PHOTINIA. *Lindley.*—GEN. CHAR. Calyx-tube campanulate or turbinate, adhering to the ovary, the limb short persistent 5-toothed, petals 5 spreading, stamens about 20 inserted into the jaws of the calyx, filaments subulate, ovary inferior or the apex free, 2-5 (rarely 1) celled with 2 erect ovules in each cell, styles 2-5 (rarely 1) free or more or less connate at the base their apices dilated truncate and stigmatic, fruit succulent crowned with the remains of the calyx teeth, endocarps thin usually 1 celled with 2 rather small oblong seeds, seeds erect, testa membranaceous or coriaceous, cotyledons plano-convex. Trees or shrubs unarmed glabrous or pubescent, leaves simple coriaceous evergreen, serrated or entire, stipules sometimes subfoliaceous, flowers small white or terminal corymbs or panicles, fruit sometimes edible.—Eriobotrya, *Lindl.*

PHOTINIA NOTONIANA. (Wall.) A large tree, leaves glabrous from cuneate-lanceolate to oblong acute, quite entire or with a few scattered inconspicuous teeth, 4-6 inches long by 2-2$\frac{3}{4}$ broad, petioles about 1$\frac{1}{4}$ inches long, panicles corymbose large very compound, puberulous, pedicels shorter than the calyx, cells of the ovary spuriously semi-bilocular, fruit glabrous 2 seeded. *WA. Prod. p.* 302 ;—*Wight Icones tab.* 991 ;—*Wight Ill. tab.* 85.

A very handsome tree, very common at the higher elevations on the Nilgiris, Anamallays, Pulnies and on the Ceylon mountains, it flowers in March and April and its fruit ripens in June and July, the latter in taste and flavor resembles that of the mountain ash. The tree is called Kaddi bikki by the Burghers on the Nilgiris, the timber is adapted for cabinet purposes, it is closely allied to, if distinct from, P. integrifolia, Lindley.



Gurindo del. Dumphry Lith.

Photinia Notoniana (Wall.)

ORDER XXXV—ROSACEÆ.

Calyx either enclosing the ovary or adhering to it or quite free 5-rarely 4-lobed with rarely the addition of as many external accessary lobes, petals as many as the true calyx-lobes inserted in the calyx at the base of its lobes, or very rarely hypogynous, very rarely none, stamens numerous or rarely few inserted with the petals free, ovary of 1-2 or more carpels usually distinct at the time of flowering but sometimes combined even then into a single 2-5 celled ovary which is then always inferior or combined with the calyx, ovules 1-2 rarely more in each carpel, styles or sessile stigmas distinct, fruiting carpels either free or variously combined with each other or with the calyx, indehiscent, or rarely opening along the inner edge, seeds exalbuminous or rarely albuminous, embryo with large cotyledons and a short radicle. Trees, shrubs or herbs ; leaves alternate simple or compound, almost always with stipules, flowers in axillary or terminal cymes, or solitary, rarely in simple racemes.

* *Ovary superior.*

Tribe I, Chrysobalaneæ.—Flowers generally unsymmetrical, style basal, ovules 2 ascending, radicle inferior.....PARINARIUM.

Tribe II, Pruneæ.—Flowers symmetrical, style subterminal, ovules 2 pendulous, radicle superior.....PYGEUM.

** *Ovary inferior.*

Tribe III, Pomeæ.—Ovary 5 rarely 1-4 celled, 2-ovuled, fruit pomaceous with the putamen 2-5 celled or drupaceous with 1-5 pyrenes.

Fruit with 2-5 bony pyrenes... ... ... COTONEASTER.
Fruit 1-5 celled ; endocarps thin ... ... PHOTINIA.

This order which yields the Apple, Pear, Quince, Medlar, Plum, Cherry, Greengage, Peach, Nectarine, Apricot, Almond, Raspberry, Strawberry and Blackberry, is only represented in S. India on the mountains ; it yields us 6 trees—1 Parinarium, a rare tree on the slopes of our western mountains ; 2 Pygeums, one of which is an enormous tree common on all our western mountains ; 1 Cotoneaster, and 2 Photinias, all three of which are common on the Nilgiris, Anamallays, Pulneys, &c. Of indigenous plants not coming within the scope of this Flora, we have as shrubs 3 species of Rubus (Raspberry) and 2 or 3 species of Rosa. And as herbs, Fragaria, (Strawberry) Potentilla, Alchemilla, Agrimonia and Poterium. Of introduced plants, Apples, Pears, Quinces, Peaches, Plums, Raspberries and Strawberries grow and fruit well on our mountains, the Cherry grows but will not fruit, and Nectarines, Greengages and Apricots will seldom produce fruit. Prunus, Maddenia, Pyrus and Stranvesia are Himalayan genera yielding trees, and Prinsepia, Spiræa and Neillia yield shrubs, but none of these genera are indigenous in the Peninsula or Ceylon.

PARINARIUM. JUSS.

For Gen. Char. see letter-press to Pl. cxci.

1. PARINARIUM INDICUM, *Bedd.*—For description, &c. see Pl. cxci.

PYGEUM. GÆRTN.

For Gen. Char. see letter-press to Pl. lix.

1. PYGEUM CEYLANICUM, *Gærtn.*—For description, &c. see Pl. lix.

2. PYGEUM WIGHTIANUM, *Bl.*—A middling sized tree, leaves ovate or ovato-lanceolate shortly acuminate, glabrous, 1½-5 inches long by ¾-2½ broad petiole 2½-4 inches long, racemes axillary pilose shorter than the leaves, petals externally very hairy round the margin, drupe glabrous transversely oblong. *Bl. Walps, Ann.* iv. 642 ;—*Thw. En. Pl. Zey. p.* 102. Polyodontia ? Ceylanica, *Wight Icones tab.* 256, *and Ill.* i. 203.

This tree is common in the central provinces of Ceylon 4000-8000 feet elevation, and is called Oonoomoo ; the ripe seeds when bruised have a powerful odour of prussic acid.

COTONEASTER. MEDIK.

Gen. Char. Calyx tube turbinate or campanulate adnate to the ovary, lobes 5 short persistent, petals 5 erect or spreading subsessile, stamens numerous inserted into the mouth of the calyx, filaments subulate, ovary inferior 2-5 celled, style 2-5 free, ovules 2 in each cell erect, drupe ovoid globose or turbinate, pyrenes 2-5 bony, 1 seeded, seed compressed, testa membranaceous or coriaceous, cotyledons plano-convex, radicle inferior. Small trees or shrubs, erect or decumbent, leaves alternate petiolate coriaceous generally evergreen, entire or serrulate, generally villous or white beneath, stipules subulate deciduous, flowers small in axillary or terminal few flowered cymes, or rarely solitary ; drupe small red or black.

1. COTONEASTER BUXIFOLIA, *Wall.*—A large shrub or small tree, very ramous, leaves oval pointed downy above when young, but at length glabrous, densely albo-tomentose beneath, about ⅓ an inch long by ¼ inch broad, petioles 1½-2 lines long, cymes few flowered, flowers small white, peduncles and calyx tomentose. *Wight Icones tab.* 992.

A very rigid dense shrub or small tree common on the higher ranges of the Nilgiris and Pulneys, and in some parts of the latter mountains it forms a very curious feature in the landscape as it grows into most fantastic shapes, and the shrubs are often so rigid and dense that a man can walk along the top of them ; it is called Hooroonay on the Nilgiris, the wood is very dense and elastic and the Todas make the club with which they kill their buffaloes from it.

Analysis of Genera, Pl. XIII, fig 3.

COTONEASTER BUXIFOLIA.

1. Piece of a branch in flower (life-size.)
2. A leaf.
3. A bud
4. A full flower.
5. The same open, petals removed.
6. The same cut vertically.
7. Anthers.
8. Ovary cut transversely.
9. A fruit. (All magnified, drawn from fresh specimens.)

PHOTINIA. LINDL.

For Gen. Char. see letter press to Pl. cxcii.

1. PHOTINIA NOTONIANA, *Wall.*—For description, &c. see Pl. cxcii.

2. PHOTINIA LINDLEYANA, *WA.*—A middling sized or small tree, branchlets lanate, leaves from oblong-lanceolate or elliptic to subobovate, acute or very obtuse, serrulate or when young almost quite entire, lanato-tomentose on both sides when young, at length glabrous above, 3-4½ inches long by about 1½ broad, petioles 1-1½ inches long tomentose, panicles terminal corymbose smaller than in Notoniana, flowers white larger than in Notoniana, pedicels equalling the calyx. *WA. Prod. p.* 302.

A rather common tree on the Nilgiris, particularly on the western side.

ORDER XXXVI—RHIZOPHORACÆ.

Calyx-tube usually adnate to the ovary, sometimes prolonged above it or rarely quite free ; the limb of 4 to about 12 lobes, valvate in the bud. Petals as many as the calyx-lobes, alternate with them, notched cut or jagged or rarely entire, the margins usually induplicate and embracing the anthers. Stamens as many or twice as many as petals or more, inserted with them at the base of the free part or lobes of the calyx ; anthers erect or versatile, 2-celled, opening longitudinally. Ovary more or less inferior or rarely quite superior, 2-or more-celled, with 2 or few pendulous ovules in each cell, or rarely 1-celled by the obliteration of the partition ; style undivided, with an entire or lobed stigma. Fruit inferior or enclosed in the calyx. Seeds solitary or few, with or without albumen. Trees or shrubs. Leaves opposite, simple, entire or slightly toothed, coriaceous. Stipules often large, very deciduous. Flowers axillary, solitary, clustered or in cymes.

Tribe I, Rhizophoreæ.—Ovary inferior, style 1, embryo without albumen and with a thick radicle enlarging rapidly and protruding to a great length from the summit of the capsule, generally before the fruit falls from the tree, leaves opposite. Maritime evergreen trees or shrubs.

Calyx 4-merous, petals entire, anthers 8 subsessile, ovary cells 2, 2-ovuled	...RHIZOPHORA.
Calyx 5-6 merous, petals emarginate appendiculate, stamens 10-12. ovary cells 3, 2-ovuled...	.. CERIOPS.
Calyx 5-6 merous, petals lacerated, stamens numerous, ovary 1-celled, 6 ovuled.. ...	...KANDELIA.
Calyx 8-14 merous, petals 2-fid appendiculate, stamens 16-28, ovary cells 1-ovuled ...	..BRUGUIERA.

Tribe II, Legnotideæ.—Ovary inferior, or quite free, style 1, embryo in fleshy albumen, leaves opposite. Forest trees or shrubs.

* *Ovary inferior.*

Stamens 10-16, flowers cymose	..CARALLIA.
Stamens 15-30, peduncles axillary 1-flowered	...WEIHEA.

** *Ovary free.*

Stamens 8, ovary 3-celled	...BLEPHARISTEMMA.

Tribe III, Anisophylleæ.—Ovary inferior, styles 3-4, embryo without albumen, axial, cotyledons rudimentary or obsolete, leaves alternate.

Petals 4, ovary terete	...ANISOPHYLLEA.

This is not an order of much importance to the forester, the 4 genera belonging to the tribe Rhizophoreæ constitute the mangroves, they are small trees or shrubs most abundant about tidal backwaters but confined to those localities ; the 2 species of Carallia are large trees. C. integerrima is common both to S. India and Ceylon, and yields a valuable timber. C. calycina is only found in Ceylon. Weihea is a small tree found in Tinnevelly and Ceylon. Blepharistemma, a shrub only observed in Coorg and Malabar, and Anisophyllea a tree inhabiting Ceylon.

RHIZOPHORA. LINN.

Gen. Char. Calyx-tube adnate, segments 4. Petals 4, entire. Stamens 8 to 12 ; filaments short, anthers long, acuminate connivent. Ovary half-inferior, 2-celled, with 2 pendulous ovules in each cell ; style filiform ; stigma 2-toothed. Fruit ovoid or conical, the persistent calyx-segments reflexed from near the base. Seed solitary, without albumen, the rapidly enlarged radicle penetrating through the summit of the fruit. Trees, leaves entire, cymes axillary.

I. RHIZOPHORA MUCRONATA, *Lam.* ; *DC. Prod.* iii. 32.—A glabrous evergreen tree, with thick branches. Leaves from broadly ovate to oblong-elliptical, obtuse, with a projecting point (often worn off from the old leaves) 3 to 7 inches long by 1-4 broad, coriaceous entire. Stipules rather large, oblong, obtuse, very deciduous. Flowers in axillary dichotomous cymes shorter than the leaves with a pair of short thick concave bracts connate at the base under each fork and under each flower. Calyx sessile within the bracts, about ½ inch long, the segments separating down to the adnate part. Petals shorter than the calyx, the induplicate margins fringed with long hairs. Anthers 8, nearly sessile, 4 embraced by the petals, 4 between them. Style rather thick, nearly as long as the petals. Fruit ovoid, 1 to 1½ inches long *Arn. in Ann. Nat. Hist.* i. 362 ;—*Wight. Ic. t.* 238 ;—*Benth. Fl. Aust.* ii. *p.* 493. *R.* Candelaria, *WA. Prod. p.* 310.

This tree is common in the tidal back-waters all along the western coast of this Presidency and Ceylon, and other places in the tropics ; it is used for tanning purposes.

Analysis of Genera, Pl. XIII, fig. 4.

RHIZOPHORA MUCRONATA.

1. Portion of a branch in very young fruit (life-size.)
2. A flower.
3. Anthers.
4. A fruit, the radicle just commencing to protrude. (2 & 3 magnified) copied from Dr. Wight's Icones.

2. RHIZOPHORA CONJUGATA, *L.*—A small tree or shrub, leaves oblong or elliptic-lanceolate mucronate coriaceous entire, 4-8 inches long by 1-3½ broad ; peduncles from the axils of the previous year's leaves solitary shorter than the petiole, thick and fleshy bracteolate at the apex, flowers 2-3 sessile, calyx 4-parted divisions ovate-oblong acute erecto-patent concave coriaceous thickened at the apex nearly twice as long as the petals and much broader, petals linear plane submembranaceous glabrous white a little longer than the stamens, stamens 8-12 generally 11. *Bl. Mus. Bot.* 1. *p.* 134.

With the preceding but not so common.

CERIOPS. ARNT.

Gen. Char. Calyx-tube adnate ; segments 5, rarely 6. Petals as many, emarginate and usually with 1 or more clavate setæ at the top. Stamens twice as many as petals ; filaments filiform, longer than the oblong or linear anthers. Ovary half-inferior, 3-celled, with 2 pendulous ovules in each cell ; style filiform ; stigma undivided. Fruit ovoid or conical, the persistent calyx-segments surrounding it below the middle. Seed solitary, without albumen, the rapidly enlarged funicle penetrating through the summit of the fruit. Trees or shrubs, with the habit and inflorescence of *Rhizophora*, but usually with smaller leaves and smaller more numerous flowers.

1. CERIOPS CANDOLLEANA, *Arnt.*—A tall evergreen glabrous shrub or small tree. Leaves obovate or broadly oblong, 1½ to 2 inches, or in luxuriant specimens 3 inches long, coriaceous, entire. Flowers in small dense almost capitate cymes, or short recurved axillary peduncles, with a pair of small short thick concave bracts under each ramification, and rather larger ones under each flower. Calyx sessile within the bracts, about 3 lines long, divided down to the adnate part Petals shorter than the calyx, emarginate, with 2 to 5 clavate setæ irregularly placed in the notch or on the lobes. Stamens alternately inserted opposite the petals and between them, but the anthers embraced in pairs by the induplicate margins of the petals. Fruit conical, about ½ inch long. *Wight Icones tab.* 240. Rhizophora Timoriensis, *DC. Prod.* iii. 32 ;—*Arnt in Ann. Nat. Hist.* i. 364 ;—*Benth. Fl. Aust.* 11. *p.* 494.

Common about the tidal back-waters on the west coast of this presidency, and in Ceylon and other places in the tropics.

Analysis of Genera, Pl. XIII, fig. 5.

CERIOPS CANDOLLEANA.

1. A portion of a branch in flower (life-size.)
2. A flower, calyx removed.
3. The same, petals removed.
4. Ovary cut transversely.
5. A fruit radicle just commencing to protrude. (3 & 4 magnified) copied from Dr. Wight's Icones

KANDELIA. ARNT.

Gen. Char. Calyx-segments 5 or 6, rarely 4, linear, shortly united above the ovary, and surrounded at the base by a cup shaped bract. Petals as many, narrow, divided into filiform segments very deciduous. Stamens numerous, or rarely definite ; filaments

slender, anthers small. Ovary 1-celled with 6 ovules pendulous from a central axis. Style filiform, with a 3-lobed stigma. Fruit oblong, the reflexed persistent calyx-segments surrounding it in the middle. Seed without albumen, the rapidly enlarged radicle pene trating through the apex of the fruit.

The genus only consists of the following species.

1. KANDELIA RHEEDII, *Arnt.*—A glabrous evergreen tree, with thick branches. Leaves oblong, obtuse, 3 or 4 inches long, quite entire, coriaceous, on a petiole of ½ to ¾ inch long. Peduncles 1, 2 or 3 in each axil, variable in length but shorter than the leaves, each bearing a compact cyme of 3 to 5 white flowers. Calyx segments 6 or 7 lines long. Petals rather shorter, and falling off so soon after the flower expands, that they may escape observation in the dried specimens. Stamens from 20 to 25. *Bl. Mus. Bot.* i. 134 ;—*Wight Ill. tab.* 89.

Common about the S. Canara and Malabar tidal back-waters, and also in other parts of the tropics.

Analysis of Genera, Pl. XIII, fig 6.

KANDELIA RHEEDII.

1. Portion of a branch in flower (life-size.)
2. A flower open.
3. A petal.
4. Stamens.
5. A style.
6. Ovary cut vertically.
7. The same cut transversely.
8. A fruit, radicle just commencing to protrude. (2 to 7 magnified) drawn from fresh specimens.

BRUGUIERA. LAM.

Gen. Char. Calyx-tube turbinate or campanulate, adnate at the base to the ovary, the upper portion free, lined by the disk, lobes 10 to 15 or rarely 8 or 9, narrow and thick. Petals as many, 2-lobed, with or without setæ at the top. Stamens twice as many as petals ; anthers linear, but usually shorter than the filaments. Ovary inferior, 2-to 4-celled, with 2 pendulous ovules in each cell ; style filiform, with 2 to 4 minute stigmatic lobes. Fruit turbinate, crowned by the persistent calyx-lobes. Seeds solitary, without albumen, the rapidly enlarged radicle penetrating through the summit of the fruit. Trees, with the habit of *Rhizophora*. Flowers solitary or few together, on short axillary recurved peduncles.

* *Peduncles* 1-*flowered, flowers large.*

1. BRUGUIERA RHEEDII, *Bl.*—A glabrous evergreen tree, leaves ovate or oblong-elliptical, very shortly acuminate, 3 to 5 inches long, narrowed into a rather long petiole, coriaceous. Stipules oblong, 1 to 2 inches long, very deciduous. Flowers solitary, on short recurved axillary peduncles, without bractes. Calyx very thick and rigid, from a little more than 1 inch to 1½ inches long, the narrow turbinate tube about one-third the whole length, the angles scarcely prominent or sometimes quite obscure, the lobes usually about 12, but variable in number. Petals shorter than the calyx, densely hairy at the base, and the induplicate margins more or less hairy to the end ; setæ usually 1 in the notch and 1 to 4 at the end of each lobe, rarely absent. Anthers embraced in pairs by the induplicate margins of the petals. Ovary very short and wholly inferior. Fruit at first crowned by the calyx-limb, which often falls off as the radicle protrudes, the latter assuming a narrow spindle-shaped form, obscurely notched, with about 6 prominent angles. *Bl. En. Pl. Jav.* 92 ;—*Benth Fl. Aust.* ii, *p.* 494. B. Rumphii and Wightii, *Bl. Mus. Bot.* i. 138. B. Australis, *A. Cunn. in Arnt. Ann. Nat. Hist.* i. 367. B. gymnorrhiza, *WA. Prod. p.* 311 (ex-parte.)

Blume makes the number of setæ on the lobes of the petals a specific distinction, and divides this plant into 3 distinct species. Common in the tidal back-waters on our western coast, and in similar localities in Ceylon and elsewhere in the tropics. The wood is of a yellowish color, hard and durable, used for house-building and for fuel.

Analysis of Genera, Pl. XIV, fig. 1.

BRUGUIERA RHEEDII.

1. Portion of a branch in flower (life-size.)
2. A flower.
3. The same, all the calyx removed, except 2 of the segments, showing the petals.
4. A petal, front view, very hairy at the base, the upper ½ to ⅔rd glabrous, 2 setæ to each lobe and 1 in the sinus.
5. The same back view.
6. A lobe of a petal showing 3 setæ present, (rarely only 1 is present, more rarely none.)
7. A petal, side view.
8. Anthers.
9. Ovary cut vertically.
10. Ovary cut transversely. All drawn from fresh flowers.

2. BRUGUIERA GYMNORRHIZA, *Lam.*—An evergreen tree, closely resembling *B. Rheedii*. Leaves usually smaller. Flowers as in that species, solitary on short recurved axillary peduncles, but smaller, varying from ¾ to nearly 1 inch in length. Calyx-tube

marked with very prominent acute angles ; lobes usually 8 to 10. Petals shorter than the calyx, hairy on the margins, the lobes obtuse, without setæ, but a very short seta often, although not always, in the notch between them. *Bl. Mus. Bot.* i. 136.

Ceylon, south of the island ; has not been observed in this presidency, but probably occurs on the west coast ; probably only a variety of No. 1.

3. Bruguiera cylindrica, *Bl.*—A small tree about 20 feet high, very like the preceding, leaves oblong-elliptical narrowed at both ends, calyx lobes usually about 10, the margin of the petals from the base to the apex densely silvery-hirsute, the lobes each with 1 seta with a long one in the sinus, otherwise as in B. Rheedii.—*Bl. Mus. Bot.* i. 137. B. eriopetala, *WA.* ;—*Wight. Ill. p.* 210. Rhizophora cylindrica, *Linn. Sp. Pl. p.* 635 (ex-parte).

Malabar and Travancore, tidal back-waters, also in similar localities elsewhere in the tropics ; probably only a variety of No. 1.

** *Peduncles several flowered, flowers small.*

4. Bruguiera caryophylloides, *Bl.*—A small or middling sized tree, leaves elliptic or elliptic-oblong acute at both ends, peduncles shorter than or as long as the petiole, 3-or dichotomously 5-flowered, calycine divisions 8, oblong-linear acute, or rather obtuse, petals shorter than the divisions of the calyx erect oblong white, margins puberulous, the lobes each furnished with 3-5 bent subclavate setæ, and a longer seta in the sinus. ovary 2-celled, the protruding radicle 5-6 inches long obtuse or subacute. *Bl. En. p.* 93. Kanilia caryophylloides, *Bl. Mus. Bot.* i. 141. Bruguiera Malabarica, *Arnt* ;—*Wight. Ill.* i. *p.* 210.

Malabar and Ceylon, tidal back-waters, also in similar localities elsewhere in the tropics.

5. Bruguiera parviflora, *WA.*—A small very ramous smooth glossy tree or large shrub, leaves oblong or lanceolate rather obtuse narrowed at the base, polished, 4-5 inches long by 1-2 broad, peduncles axillary 3-or cymosely many-flowered, calyx tube ribbed, 8-cleft, segments acute erect in fruit, petals much shorter than the calyx, obovate, sericeo-puberulous on the outside, each obtuse lobe furnished with 3 rarely 5 subclavate setæ and 1 seta present in the sinus ; ovary 3-celled, protruding radicle cylindric rather obtuse. *WA. Prod. p.* 311 *in Obs.* Rhizophora parviflora, *Roxb Fl. Ind.* ii. *p.* 461. Kanilia parviflora, *Bl. Mus. Bot.* i. 140.

Tidal back-waters on the west coast of this presidency, and at Masulipatam on the east coast, also in similar localities elsewhere in the tropics.

CARALLIA. Roxb.

For Gen Char. see letter press to Pl. cxciii.

1. Carallia integerrima, *DC.*—For description, &c. see Pl. cxciii.

2. Carallia calycina, *Benth.*—A large tree, leaves glabrous entire ovate to obovate shortly acuminate narrowed at the base, parallelo-venose, punctulate beneath, 1½-3 inches long by 1-1¾ inches broad, petiole 1-3 lines long, stipules interpetiolar about 8 lines long, soon deciduous, cymes axillary solitary few-flowered sparingly branched above the middle, about ½ as long as the leaf, bracteoles rotundate retuse, generally mucronulate about 1 line long, flowers subsessile 3 lines long, calyx lobes about as long as the tube, petals white unguiculate, margin inciso-sinuate. *Benth. in Linn. Journ. Bot.* iii. 75 ;—*Thw. En. Pl. Zey. p.* 121.

Ceylon, near Galle in the plains, and central provinces, 4000-5000 feet elevation ; the higher level form has smaller more coriaceous leaves.

WEIHEA. Spr.

For Gen Char. see letter press to Pl. cxciv.

1. Weihea Zeylanica, *Gard.*—For description, &c. see Pl. cxciv.

BLEPHARISTEMMA. Wall.

Gen. Char. Calyx ebracteolate at the base, tube ovoid terete adnate to the base of the ovary, limbs shortly 4-lobed at the apex, lobes small triangular erect, disk 8-toothed at the base of the calyx but nearly free from it, petals 4 inserted at the bottom of the calyx and adnate to the base of the disk, as long or longer than the calyx, unguiculate, lacerated at the apex, stamens 8 inserted into the margin of the disk between the teeth, filaments hairy alternately shorter, anthers small oblong, ovary ovoid free 3-celled, style obsolete or as long or nearly twice as long as the calyx, stigma 3-lobed or truncate, ovules 2 in each cell pendulous collateral, fruit unknown. A shrub or small tree, glabrous except the young buds stipules and inflorescence, leaves opposite crenate penniveined, stipules interpetiolar caducous, flowers small in axillary cymes.

1. Blepharistemma corymbosa, *Wall.*—A shrub or small tree, leaves oval elliptic or oblong acute or obtuse irregularly crenate, acute or rounded at the base, 4-5½ inches long by 1½-3 inches broad, cymes axillary many flowered, peduncles about ½ inch long, pedicels about 1 line long calyx 1½ line long externally hirsute. *Benth. in Journ. Lin. Soc. vol.* iii. *p.* 78. Dryptopetalum membranaceum, *Mig. in Pl. Hohenack. n.* 713.

I have found this on maidans at Tellicherry (Malabar), sea level; and on the Coorg mountains, 2500 feet; the plants differ slightly, but I should not like to separate them as species. The Coorg plant has much smaller and more membranaceous leaves, is a small tree or large shrub, and has no style and a 3-lobed stigma. As far I have observed, they both have all their flowers fertile, but in the Tellicherry plant (which is a very small shrub), some of the flowers have the style and petals equal in length to the calyx, others the petals a 3rd longer and the style double as long, the stigma is truncate in both these flowers, and the ovaries and stamens the same in both.

Analysis of Genera, Pl. XIV, fig. 2.

BLEPHARISTEMMA CORYMBOSA.

1. A portion of a corymb showing 2 of the flowers with a long style, and one with a short one.
2. A long styled flower open, stamens inserted into the sinuses of the teeth of the disk, petals into the calyx tube at the bottom of the disk.
3. Ovary and truncate style.
4. A petal and stamen, both ciliate.
5. Anthers, front and back view.
6. Ovary cut vertically.
7. The same cut transversely.
8. A short styled flower opened, showing that the petals are shorter.
9. Ovary from the same, showing the short style (internal structure the same as 6 & 7.)
10. A short styled flower. (All magnified dissections from the Tellicherry plant.)
11. Ovary with a sessile 3-lobed stigma drawn from the Coorg plant.

ANISOPHYLLEA. BROWN.

For Gen. Char. see letter press to Pl. cxcv.

1. ANISOPHYLLEA ZEYLANICA, *Benth.*—For description, &c. see Pl. cxcv.

ORDER XXXVII—COMBRETACEÆ.

Calyx-tube adnate to the ovary at the base, narrowed above it and sometimes elongated; limb usually campanulate, with 4 or 5, rarely more teeth, lobes or segments, valvate or very rarely induplicate or imbricate. Petals none, or as many as calyx-lobes, usually small imbricate or valvate. Stamens as many or twice as many as calyx-lobes, rarely indefinite, inserted on the calyx; anthers opening in longitudinal slits or (in *Gyrocarpeæ*) in 2 valves. Ovary inferior, 1-celled, with 2 or more pendulous ovules, or (in *Gyrocarpeæ*) with 1 only; style filiform or scarcely any with an entire terminal stigma. Fruit coriaceous, chartaceous or drupaceous, indehiscent or rarely dehiscent. Seed solitary, pendulous, without albumen; cotyledons convolute or folded, very rarely flat inside and furrowed outside; radicle short, superior. Trees, shrubs or woody climbers. Leaves alternate or opposite, entire, without stipules. Flowers in axillary or terminal racemes spikes or heads, or (in *Gyrocarpeæ*) in cymes. Bractes usually small, bracteoles sometimes larger, often wanting.

SUB-ORDER COMBRETEÆ.—Anthers opening by slits, ovules 2 or more, flowers in racemes spikes or heads.

** Petals 0.*

Calyx tube terete not prolonged beyond the ovary, flowers spicate ... ...TERMINALIA.
Calyx tube 2 winged at the base, flowers densely capitate ... ...ANOGEISSUS.

** * Petals 5.*

Calyx tube persistent, stamens 5-10, leaves alternate ... ...LUMNITZERA.

SUB-ORDER GYROCARPEÆ.—Anthers opening in 2 valves, ovules solitary, petals 0, flowers in cymes.

Calyx lobes imbricate, 2 increasing in fruit... ... ...GYROCARPUS.

An order of considerable importance to the forester. 6 species of Terminalia being large valuable timber trees common to almost all our dry forests. Anogeissus latifolius, also a valuable timber, is equally common. Anogeissus acuminatus, a very beautiful tree with a valuable timber is only found towards the northern part of our eastern coast. The Gyrocarpus is a soft light-wood tree common everywhere. The Lumnitzera a small sea-coast tree. 1 species of Terminalia is peculiar to Ceylon, and 1 to the Bombay Presidency. Of plants not coming within this Flora, the genus Combretum yields 3 large woody climbers. Quisqualis 1 indigenous and 1 introduced climber, and Calycopteris one scandent shrub; there are no herbaceous plants in the order.

TERMINALIA. LINN.

For Gen. Char. see letter-press to Pl. xvii.

1. TERMINALIA TOMENTOSA, *Roxb.*—For description, &c. see Pl. xvii.

2. TERMINALIA PANICULATA, *Roxb.*—For description, &c. see Pl. xviii.

3. TERMINALIA ARJUNA, *Roxb.*—For description, &c. see Pl. xxviii.

4. TERMINALIA BELERICA, *Roxb.*—For description, &c. see Pl. xix.

5. TERMINALIA CATAPPA, *Willd.*—For description, &c. see Pl xx.

6. TERMINALIA CHEBULA, *Retz.*—For description, &c. see Pl. xxvii.

7. TERMINALIA PARVIFLORA, *Thw.*—A large tree, young branches and petioles ferrugineo-pilose, at length glabrous, leaves subopposite oblong abruptly acuminate entire glabrous, beneath very minutely reticulate, without glands, 3-5 inches long by 1½-2½ broad, petiole without glands 3-5 lines long, spikes pilose terminal paniculate nearly equalling the leaf; flowers small white, calyx campanulate shortly toothed externally pilose internally villous, drupe ovoid fleshy subpentagonal glabrous greenish 1 inch long, putamen deeply and broadly 5-sulcate. *Thw. En. Pl. Zey. p.* 10.

Ceylon, central provinces, up to an elevation of 4000 feet, called Hampalanda.

8. TERMINALIA GELLA, *Dalz.*—A large handsome tree, leaves broadly oval puberulous on both sides, when young lanately tomentose, 9 inches long by 5 broad, finely reticulated and destitute of glands, petioles without glands, spikes axillary solitary tomentose shorter than the leaf, lower flowers fertile short pedicelled, upper male sessile, all woolly within, calyx segments triangular acute revolute after flowering, drupe spherical sericeous 9-10 lines in diameter. *Dalz. Hook. Journ. of Bot.* iii. 227.

A rare tree on the Concan ghats discovered and described by Mr. Dalzell. I have never met with it; it must be closely allied to T. chebula, but is destitute of glands; the fruit (myrobalans) has the same properties as that of T. chebula and Belerica, and is equally an article of commerce.

ANOGEISSUS. WALL

For Gen Char see letter-press to Pl. xv.

1. ANOGEISSUS LATIFOLIUS, *Roxb.*—For description, &c see Pl. xv.

2. ANOGEISSUS ACUMINATUS, *Roxb*—For description, &c see Pl. xvi.

LUMNITZERA. WILLD.

Gen. Char. Calyx tube produced above the ovary, but scarcely contracted, the limb campanulate, shortly 5 lobed or 5-toothed. Petals 5, spreading. Stamens 10 or fewer. Ovules 2 to 5, style filiform, with a minute stigma. Fruit ovoid-oblong crowned by the persistent calyx, narrowed and flattened at the base, hard and almost woody. Seed linear, with convolute cotyledons. Maritime trees or shrubs. Leaves crowded at the ends of the branches, obovate or cuneate, thick entire or slightly crenate. Flowers in short racemes. Bracteoles 2, adnate to the base of the calyx-tube, persistent but not enlarged after flowering. *Benth. Fl. Aust.* ii. *p.* 503.

1. LUMNITZERA RACEMOSA, *Willd.*—A middling sized tree or tall shrub, leaves obovate or oblong cuneate, very obtuse often 2 inches long thick and fleshy, flowers small white in axillary racemes which are about as long as the leaves, calyx about 4 lines long when in flower, 6 lines when in fruit, the lobes and teeth very short, petals 1½ lines long and the stamens very little shorter. *DC. Prod.* iii. 22 Petaloma alternifolia, *Roxb. Fl. Ind.* ii. *p.* 373. Kada Kondel, *Rheede Mal. vol.* vi. *t.* 37.

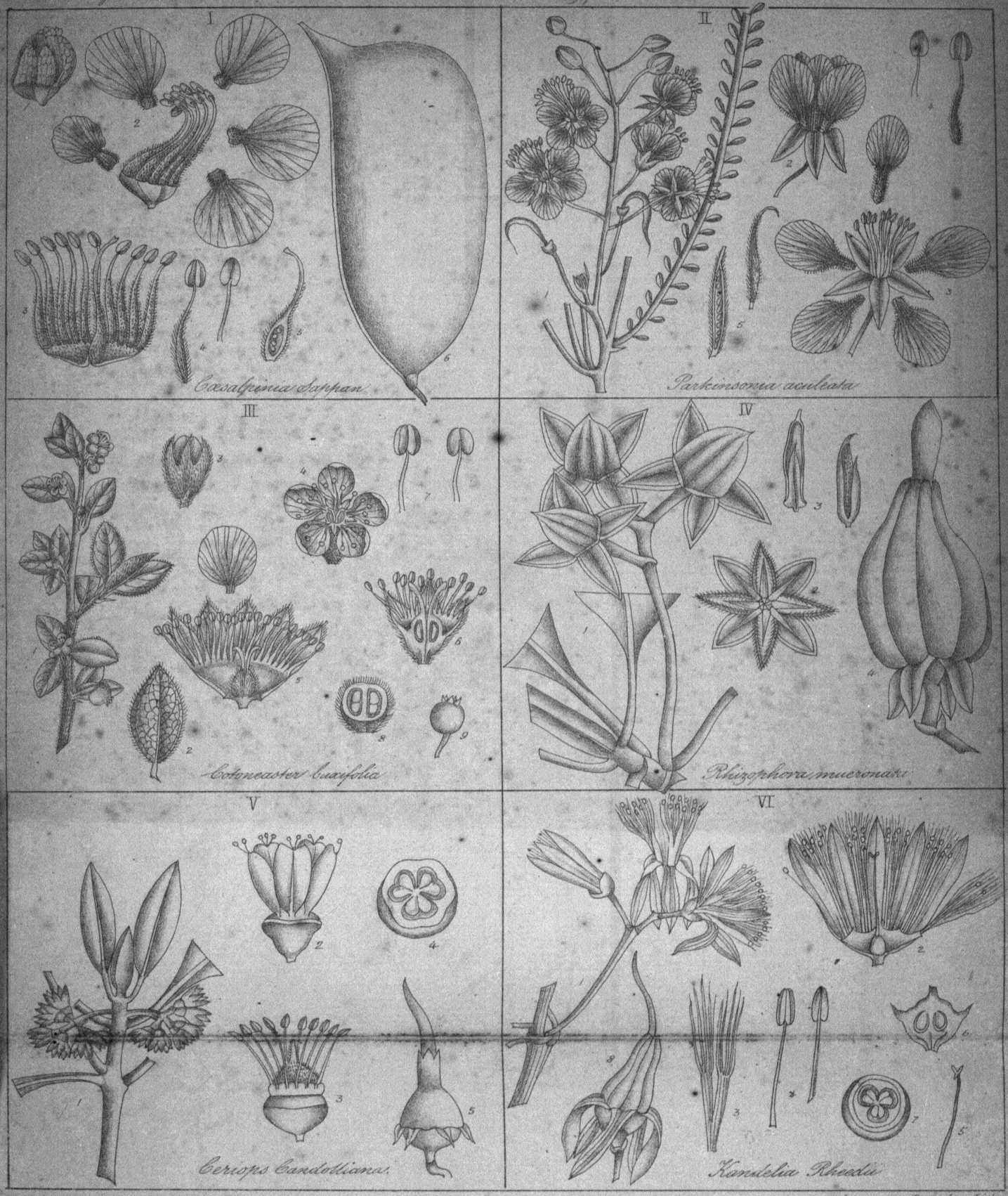
This tree is common in the salt marshes and tidal backwaters on the western coast of this presidency, and I have also observed it at Balasore on the eastern coast, and it is common in the delta of the Ganges, and in other parts of tropical Asia and in Australia, it flowers in March and April; the wood is remarkably strong and durable, and is in use for posts and house building, and for fuel.

GYROCARPUS. JACQ.

For Gen. Char. see letter-press to Pl. cxcvi.

1. GYROCARPUS JACQUINI, *Roxb.*—For description, &c. see Pl. cxcvi.

Leguminosæ *Rosaceæ* *Rhizophoraceæ*



CARALLIA INTEGERRIMA. (Nat. order Rhizophoraceæ.)

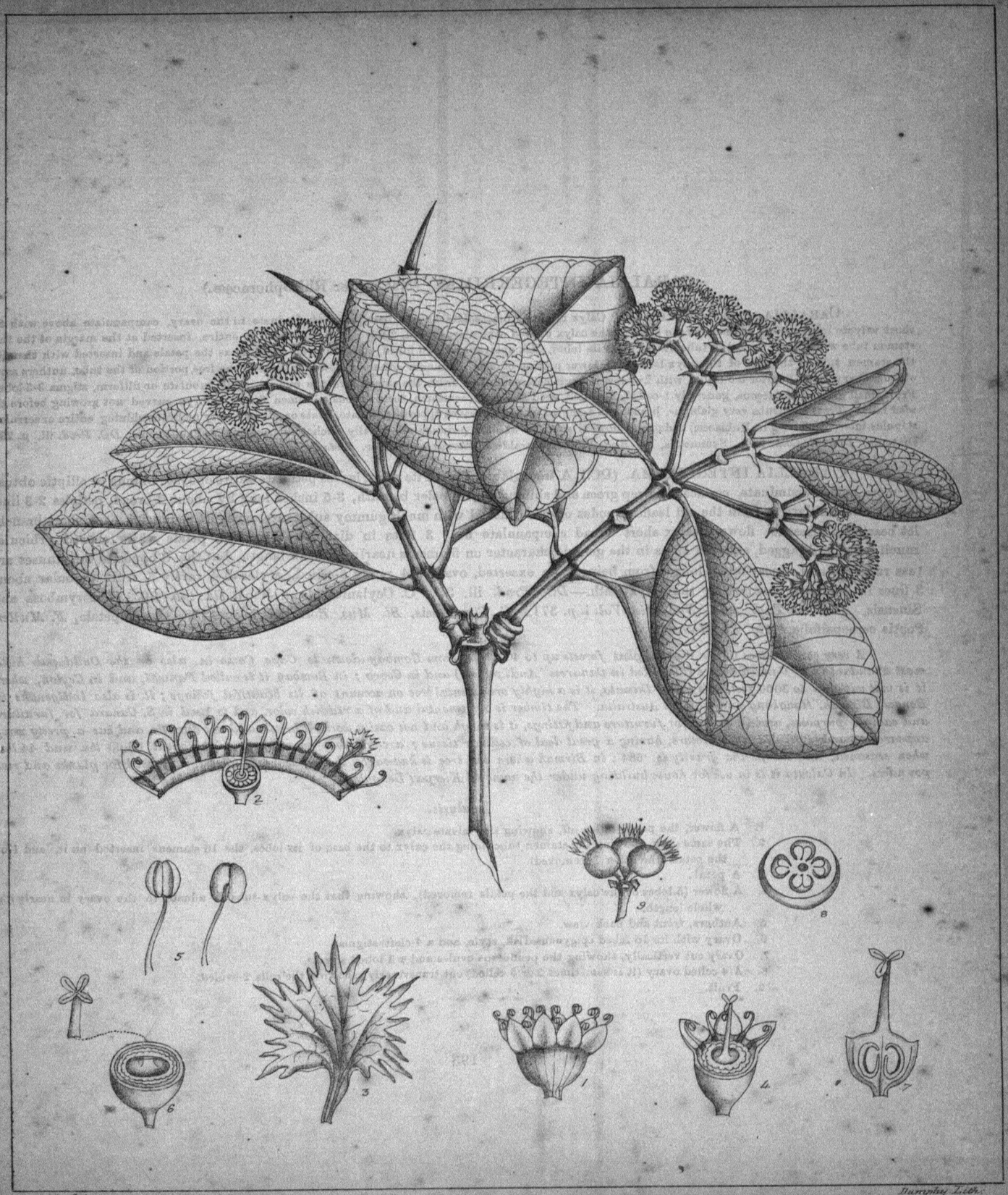
CARALLIA, *Roxb.*—GEN. CHAR. Calyx minutely bracteolate at the base, tube semi-adnate to the ovary, campanulate above with 5-8 short valvate lobes, petals as many as the lobes of the calyx clawed orbicular, jagged, 2-fid, slightly toothed, or entire, inserted at the margin of the thin stamen tube which lines the calyx tube nearly up to its lobes, disk epigynous 10-16 lobed, stamens twice as many as the petals and inserted with them on the stamen tube at the base of the calyx-lobes, the lower portion of the filaments adherent down to base of the free portion of the tube, anthers small oblong, ovary semi-inferior 3-5 celled, with 2 ovules in each cell, pendulous from the axis above the middle, style subulate or filiform, stigma 3-5 lobed. Fruit small globose coriaceous, generally 1-celled, 1-seeded, seed globosely reniform, testa fibrous, albumen fleshy, embryo curved not growing before the seed falls. Trees or shrubs very glabrous, branchlets 4-angled or terete, leaves opposite petiolate, ovate or elliptic, very glabrous shining entire or serrulate stipules interpetiolar (as in Rubiaceæ) caducous, flowers small in axillary pedunculate usually trichotomous cymes.—Petalotoma, *DC. Prod.* iii. *p.* 294. Diatoma, *Lour Fl. Coch.* 296. Symmetria, *Bl. Bijd.* 1130. Barraldeia, *Thouars, Gen. Nov. Madag.* 24.

CARALLIA INTEGERRIMA. (DC.) A tree, glabrous in all its parts, leaves petiolate entire obovate-oblong or elliptic obtuse or more or less acuminate, coriaceous, deep green and shining above, paler beneath, 3-5 inches long by about 2 broad, petioles 2-3 lines long, cymes axillary or from the old leafless nodes often furnished with much gummy substance, on short peduncles, each short branchlet bearing 3-5 sessile flowers, calyx short broad campanulate not 3 lines in diameter, 8-toothed, petals white clawed orbicular much lobed and jagged, stamens 16 as in the generic character on filaments nearly equal in length, but the 8 opposite the sinuses are less recurved and appear much longer from being more exserted, ovary 3-4 rarely 5-celled, styles 3-4 rarely 5, fruit globular about 3 lines in diameter crowned by the calyx-teeth.—*DC. Prod.* iii. 33. C. Ceylanica, *Arnt. Wight Ill. tab.* 90. C. corymbosa and Sinensis, *Arnt. in Tayl. Ann. Nat. Hist. Vol.* i. *p.* 371. C. Timorensis, *Bl. Mus. Bot. Vol.* i. *p.* 128. C. octopetala, *F. Muller.* Pootia cereopsifolia, *Mig. Pl. Hochst.*

A very common tree in our Western ghat forests up to 4000 *feet from Bombay down to Cape Comorin, also on the Cuddapah hills, most abundant in S. Canara (where it is called in Canarese 'Andi punar) and in Coorg ; in Bombay it is called Punschi, and in Ceylon, where it is met with up to* 3000 *feet, it is called Dawata, it is a highly ornamental tree on account of its beautiful foliage ; it is also indigenous in Bengal, Birmah, Hongkong and tropical Australia. The timber is ornamental and of a reddish color, and is used in S. Canara for furniture and cabinet purposes, and in Ceylon for furniture and fittings, it is tough and not easily worked, brittle and not durable, and has a pretty wavy appearance, and is peculiar in structure, having a great deal of cellular tissue ; a cubic foot unseasoned weighs about* 56-60 *lbs. and* 44 *lbs. when seasoned, and its specific gravity is* ·684 ; *in Birmah where the tree is known by the name of Manioga, it is used for planks and rice pounders. In Calcutta it is in use for house building under the name of Kierpa (Bengalee.)*

Analysis.

1. A flower, the petals fallen off, showing the valvate calyx.
2. The same open, showing the stamen tube lining the calyx to the base of its lobes, the 16 stamens inserted on it, and 1 of the petals (the other 7 removed).
3. A petal.
4. A flower (5 lobes of the calyx and the petals removed), showing that the calyx-tube is adnate to the ovary in nearly its whole length.
5. Anthers, front and back view.
6. Ovary with its 16 lobed epigynous disk, style, and a 4-cleft stigma.
7. Ovary cut vertically, showing the pendulous ovules and a 3-lobed stigma.
8. A 4-celled ovary (it is sometimes 3 or 5 celled) cut transversely, showing the cells 2-ovuled.
9. Fruit.



Govinda del.

Dunphey Lith.

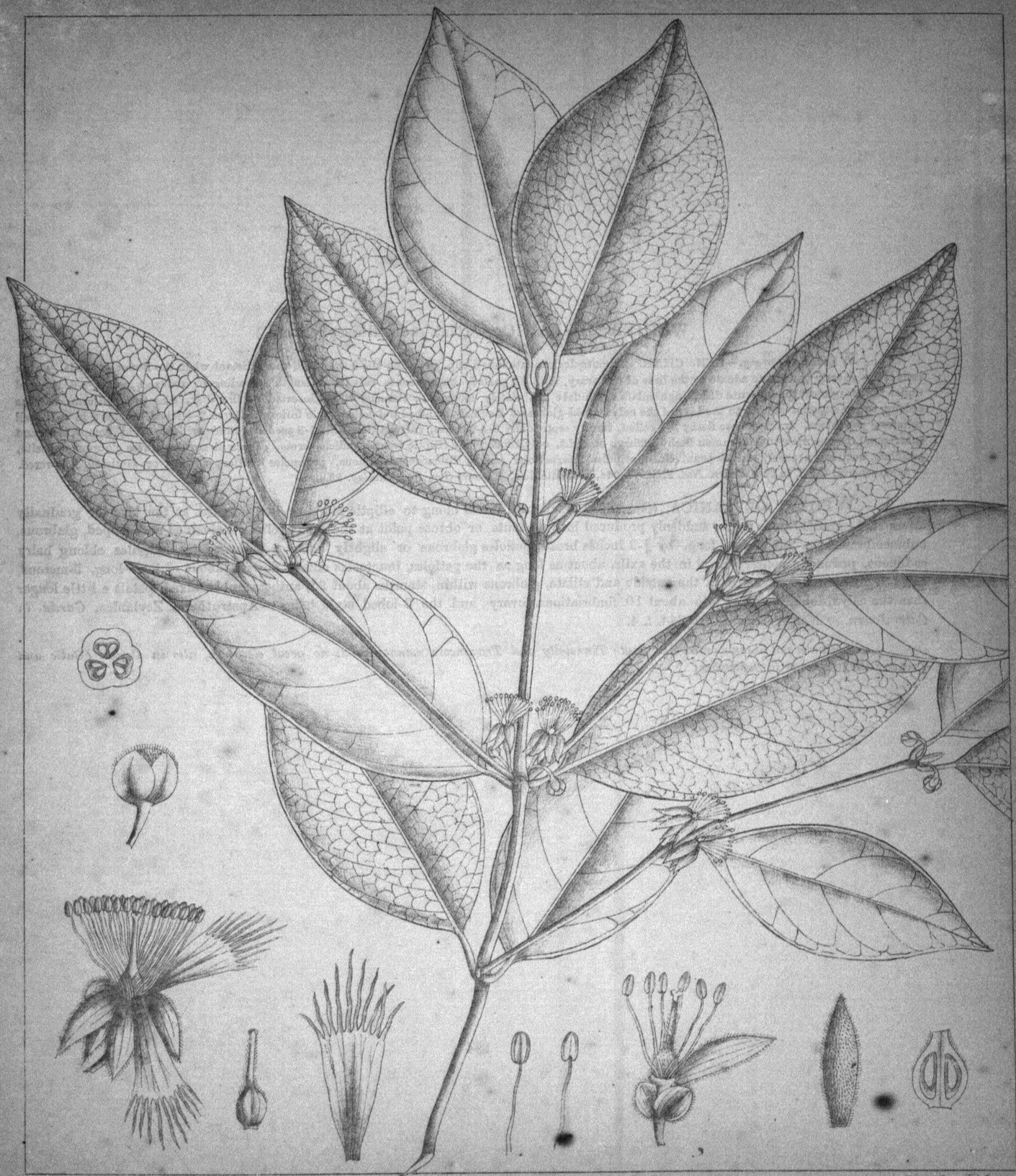
Carallia integerrima, DC.

WEIHEA ZEYLANICA. (Nat. order Rhizophoraceæ.)

WEIHEA, *Spreng.*—GEN. CHAR. 2 bracteoles connate into a cup, enclosing the flower bud, more distant when the flower expands. Calyx tube very shortly turbinate adnate to the base of the ovary, limb 4-5 parted, the segments valvate at length spreading or reflexed, petals 4-6 inserted under the margin of the obscure disk, unguiculate spathulate fimbriately lacerated; stamens 10-30 inserted on the disk, filaments filiform, anthers oblong, ovary superior adnate to the base of the calyx ovoid-globose 3-5 sulcate or lobed 2-4-celled, style filiform, stigma 2-4-lobed, ovules 2 in each cell collateral pendulous, fruit globose fleshy 3-4 celled, tardily septicidally 3-4-valvate, valves thick, cells 1-2 seeded. Seed arillate ovoid compressed and subtrigonal, testa coriaceous, albumen fleshy, embryo straight, cotyledons plane elliptic venose, radicle terete. Trees or shrubs, leaves glabrous opposite, petiolate, entire or obtusely serrate penniveined, stipules interpetiolar (as in Rubiaceæ) deciduous, peduncles axillary solitary or fascicled 1-flowered, —Anstrutheria, *Gard. in Calc. Journ. Nat. Hist.* vi. 344, *t.* 4. Richiæa, *Thouars Gen. Nov. Madag.* 25.

WEIHAE ZEYLANICA, (Gardn.) A small tree, leaves olong to elliptic more or less rounded at the base or gradually attenuated, gradually or rather suddenly produced into an acute or obtuse point at the apex, veins penniveined and looped, glabrous, submembranceous 2-5 inches long, by $\frac{3}{4}$-2 inches broad, petioles glabrous or slightly hairy 2-3 lines long, stipules oblong hairy caducous, peduncles solitary or 2 in the axils, about as long as the petioles, bracteoles ciliate, flowers about $\frac{3}{4}$ inch long, 5-merous, calyx segments reflexed hairy on the outside and ciliate, glabrous within, stamens about 25, anthers subbasifixed, petals a little longer than the calyx, lobes lacerated into about 10 fimbriations, ovary and the 3-lobed style hairy.—Anstrutheria Zeylanica, *Gardn. in Calc. Journ. of Nat. His. vol.* vi. *p.* 344. *t.* 4.

A small tree not uncommon on the South Tinnevelly and Travancore mountains at no great elevation, also in Ceylon (Galle and Trincomalee), in flower in September.



Corrêa del. Murphy Lith.

Weihea Zeylanica, (Gard.)

BENGAL SECRETARIAT
LIBRARY.

ANISOPHYLLEA ZEYLANICA. (Nat. order Rhizophoraceæ.)

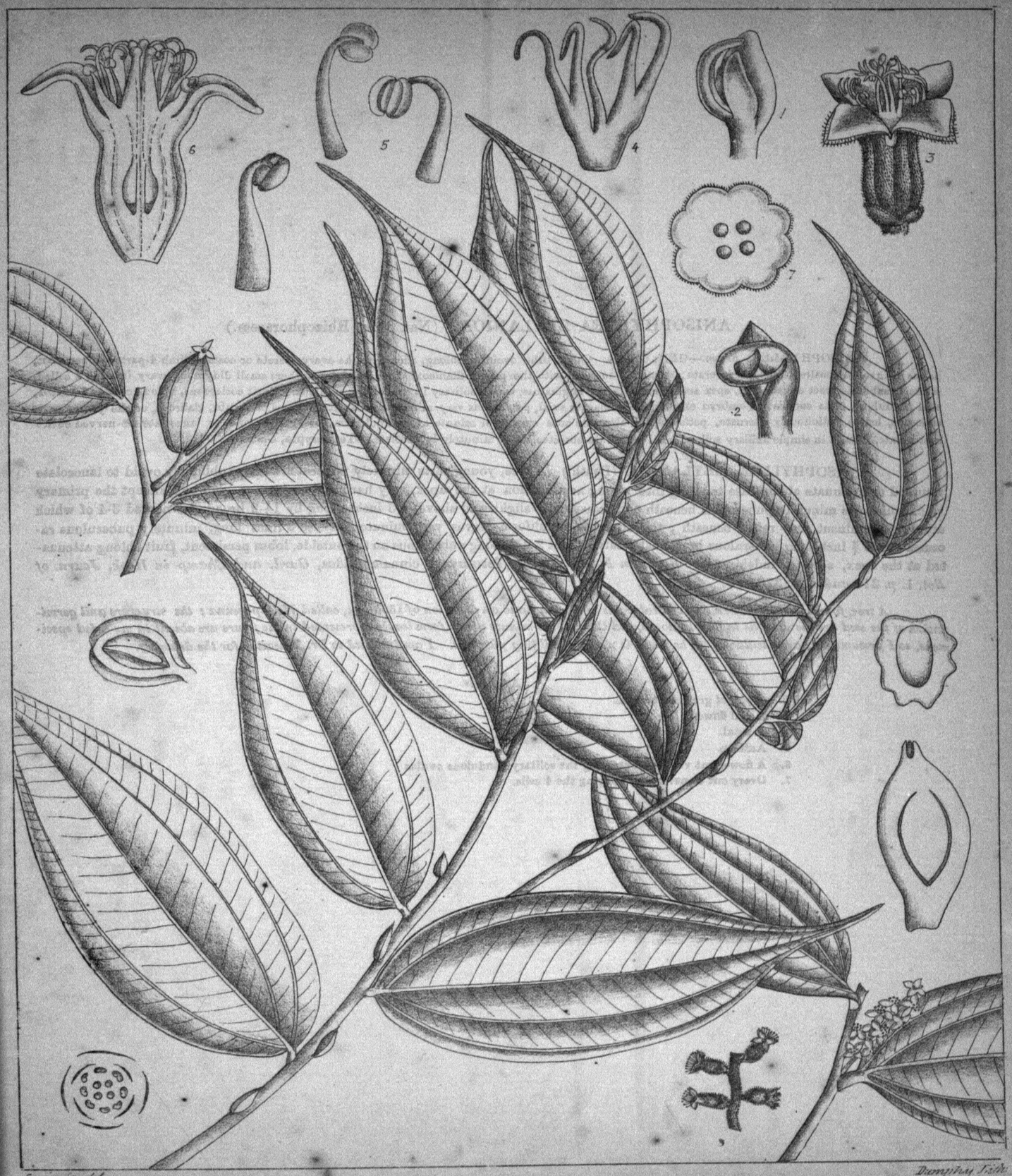
ANISOPHYLLEA. *Brown.*—GEN. CHAR. Calyx tube ovoid or oblong, aduate to the ovary, terete or costate, limb 4-parted, lobes erect, petals 4, involute, entire 2-lobed or lacerate; stamens 8 inserted with the petals, filaments short subulate, anthers small didymous ovary inferior 4 celled, styles 4, subulate erect or recurved, apex acute or subcapitate stigmatose, ovules solitary in the cells, pendulous. Fruit coriaceous, oblong costate 1-seeded, seed pendulous, testa coriaceous, embryo exalbuminous clavate axial, cotyledons very minute or obsolete. Trees or shrubs, glabrous, or the young parts sericeous, leaves distichously alternate, petiolate, the alternate ones smaller or minute and stipuliform, obliquely ovoid or lanceolate 3-5-nerved entire exstipulate, flowers in simple axillary spikes, small or minute ebracteolate or minutely bracteolate.—Tetracrypta, *Gardn.*

ANISOPHYLLEA ZEYLANICA. (Benth.) A tree, young parts minutely puberulous, leaves obliquely ovoid to lanceolate rounded or attenuate at the base tapering into a long acumination at the apex, very hard and coriaceous, glabrous except the primary veins which are minutely puberulous beneath and occasionally slightly so above, 4-5 inches long by 1½-2 broad, 3-5 nerved 3-4 of which are very prominent and raised beneath ; the alternate stipuliform leaves very minute, petioles 3 lines long, minutely puberulous racemes about ¾ inch long puberulous bracteolate, calyx about 2 lines long puberulous on the outside, lobes persistent, fruit oblong attenuated at the apex, costate, indehiscent. *Benth. in Flora. Niger.* Tetracrypta cinnamonoides, *Gard. and Champ. in Hook. Journ. of Bot.* 1. *p.* 314 *and* v. *p.* 378. *t.* 5.

A tree, found in the southern and central parts of Ceylon up to an elevation of 1500 *feet, called Wellapeyenna ; the structure and germination of the seed are the same as in Barringtonia and Careya, the minute stipuliform leaves represented in the figure are absent in my dried specimens, so I presume they are deciduous. The wood is used for building purposes. I am indebted to Dr. Thwaites for the drawing.*

Analysis.

1-2. Apex of growing branch.
3. A full flower.
4. A petal.
5. Anthers.
6. A flower cut vertically, showing the solitary pendulous ovules.
7. Ovary cut transversely, showing the 4 cells.



Govindu, del. Dampsey Lith.

Anisophyllea Zeylanica (Benth.)

GYROCARPUS JACQUINI. (Nat. order Combretaceæ.)

GYROCARPUS. *Jacq.*—GEN. CHAR. Calyx tube adnate to the ovary, or none in male flowers, limb 4 to 7 cleft. Petals none. Stamens 4 to 6, alternating with as many club shaped staminodia, or fewer or none in the female flowers. Ovary inferior, with 1 pendulous ovule and a sessile stigma, abortive in the male flowers. Drupe dry, crowned by 2 much elongated, erect, spathulate, wing like calyx lobes. Seed oblong, pendulous, without albumen, cotyledons petiolate, convolute round the radicle. A tree. Leaves alternate, broad, entire or lobed. Flowers polygamous, very small, crowded in dense corymbose cymes.

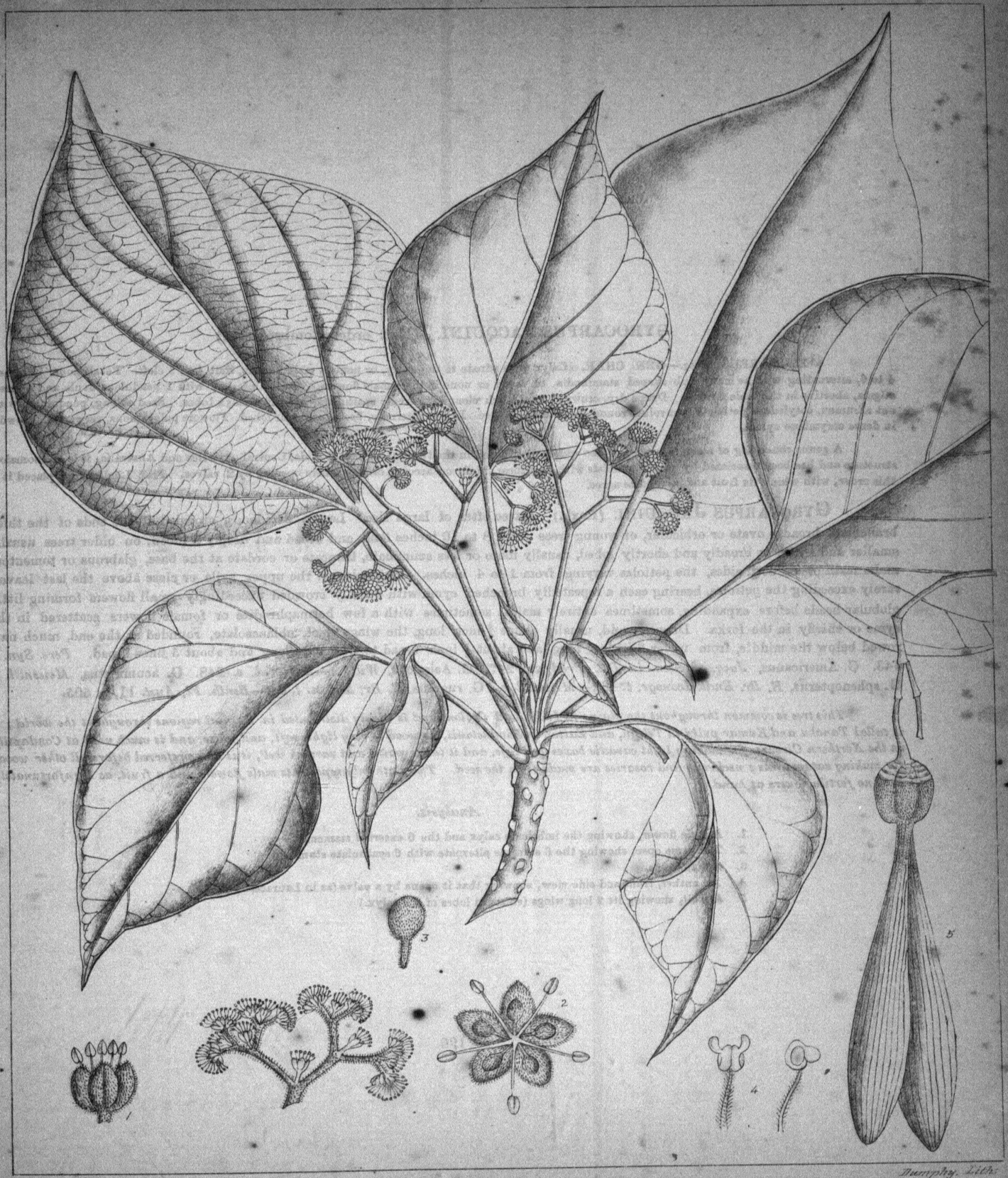
A genus consisting of a single species, a tree widely distributed in the tropical regions of Asia, Central America and Australia, it is of anomalous structure and has been associated by many botanists with Laurineæ chiefly on account of its anthers opening by 2 valves. Prof. Lindley first placed it in this order, with which its fruit and seed quite agree.

GYROCARPUS JACQUINI. (Roxb.) A tree often of large size. Leaves deciduous, crowded at the ends of the thick branchlets, broadly ovate or orbicular, on young trees often 8 to 10 inches long and broad and deeply 3 lobed, on older trees usually smaller and entire or broadly and shortly lobed, usually more or less acuminate, truncate or cordate at the base, glabrous or tomentose underneath or on both sides, the petioles varying from 1 to 4 inches. Peduncles in the upper axils or close above the last leaves, rarely exceeding the petioles, bearing each a repeatedly branched cyme with densely crowded exceedingly small flowers forming little globular heads before expanding, sometimes entirely males, sometimes with a few hermaphrodite or female flowers scattered in the cyme or chiefly in the forks. Drupes ovoid, usually about $\frac{3}{4}$ inch long, the wings erect, oblanceolate, rounded at the end, much narrowed below the middle, from under 2 inches long and about $\frac{1}{2}$ inch broad to $2\frac{1}{2}$ inches long and about 5 lines broad. *Pers. Syn.* i. 143. G. Americanus, *Jacq. Meissn. in DC. Prod.* xv. 247. G. Asiaticus, *Willd.*;—*Meissn. l. c.* 248. G. acuminatus, *Meissn. l. c.* G. sphenopterus, *R. Br. Endl. Iconogr. t.* 43;—*Meissn. l. c.* G. rugosus, *R. Br. Meissn. l. c.*;—*Benth. Fl. Aust.* 11, *p.* 505.

This tree is common throughout the plains in India and Ceylon, and is widely distributed in tropical regions throughout the world; it is called Tanaku and Kumar pulki in Teligu, and Zaitun in Hindustanii, the wood is very light, soft, and white, and is much used at Condapilly in the Northern Circars for making light cavadie boxes and toys, and it takes paint and varnish well, it is also preferred before all other woods for making catamarans; necklaces and rosaries are made from the seed. The plate only represents male flowers and a fruit, as I unfortunately have no fertile flowers at hand.

Analysis.

1. A male flower, showing the imbricate calyx and the 6 exserted stamens.
2. The same open, showing the 6 stamens alternate with 6 spathulate staminodes.
3. A staminode.
4. An anther, front and side view, showing that it opens by a valve (as in Lauraceæ.)
5. A fruit, showing its 2 long wings (enlarged lobes of the calyx.)



Govindo. del. Murphy. Lith.

Gyrocarpus Jacquini (Roxb.)

EUGENIA JAMBOLANA. (Nat. order Myrtaceæ.)

For Gen. Char. see the Order in the Manual.

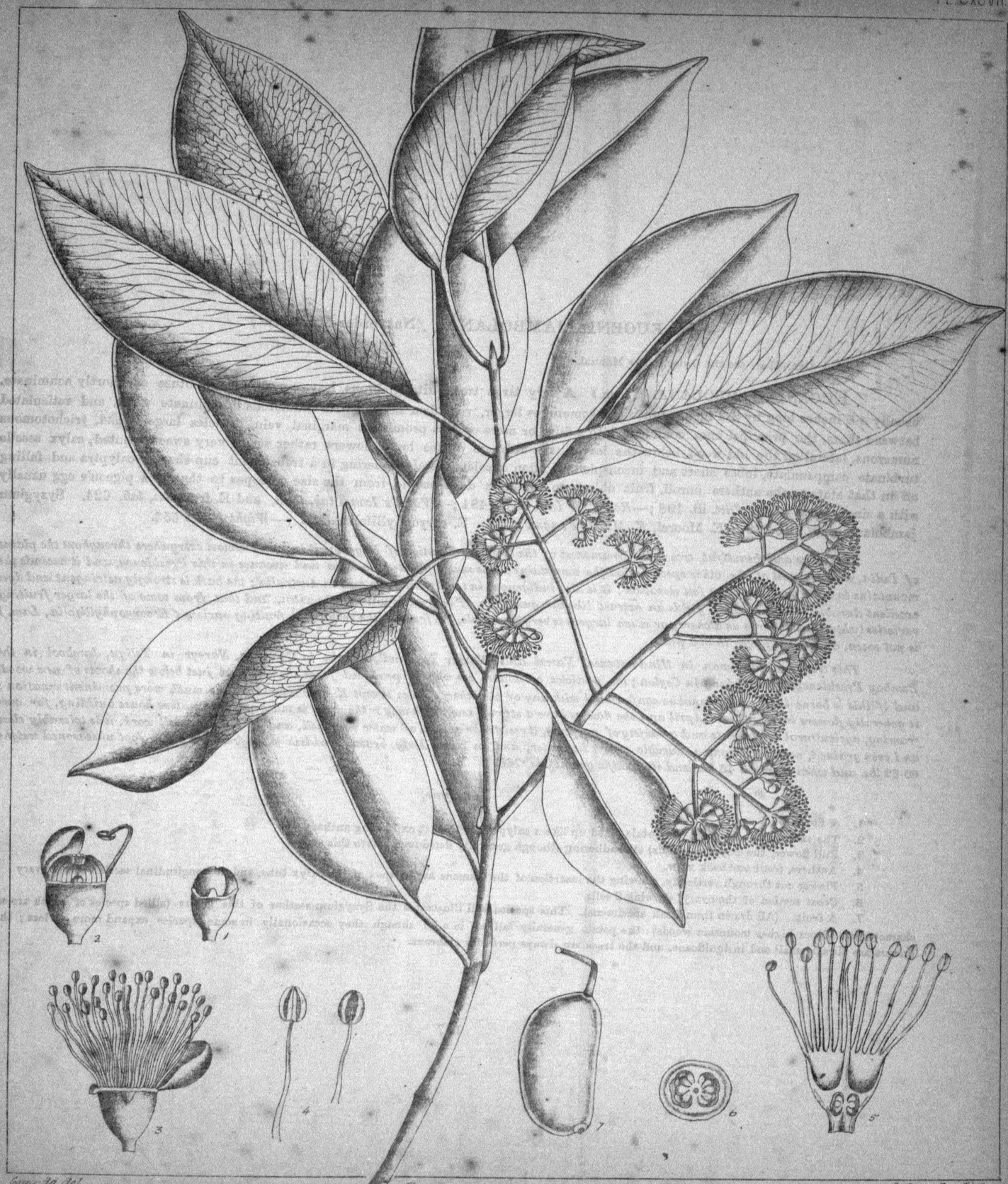
EUGENIA JAMBOLANA. (Lam.) A very large tree, quite glabrous, leaves oval oblong obtuse or shortly acuminate, usually 4-6 inches long by 2-3 inches broad but sometimes larger, very firm shining with numerous fine pinnate veins, and reticulated between them, the principal ones confluent into a faint or more or less prominent marginal vein, panicles large broad, trichotomous numerous, lateral on the old wood below the leaves, the ultimate cymes loose, flowers rather small very sweet scented, calyx sessile turbinate campanulate, lobes short and inconspicuous often obsolete, petals cohering in a transparent cup-shaped calyptra and falling off in that state as the anthers unroll, fruit oblong to roundish deep-purple, from the size of a pea to that of a pigeon's egg usually with a single seed. *Lam. Dict.* iii. 198 ;—*Roxb. Fl. Ind.* ii. *p.* 484 ;—*Wight's Icones tab.* 535, and E. fruticosa, *tab.* 624. Syzygium jambolanum, *DC.* iii. 259. E. Moorei, *F. Muell. Fragm.* v. 33. E. caryophyllifolia, *Lam.* ;—*Wight Icones* 553.

This large and beautiful tree is the commonest of the Syzygium section of Eugenia, it is found almost everywhere throughout the plains of India, whereas most of the other species affect the mountains ; it is much planted in topes and avenues in this Presidency, and it ascends the mountains to 4000 *or rarely* 5000 *feet elevation ; it is also indigenous in the Archipelago and in Australia ; the bark is strongly astringent and dyes excellent durable browns, and it yields an extract like the gum kino. The fruit is universally eaten, and that from some of the larger fruiting varieties (when it is as large as a cherry or much larger) is very agreeable, the fruit of the very small fruiting variety (E. caryophyllifolia, Lam.) is not eaten, and is not larger than a pea.*

This tree is called Jàman in Hindoostanee, Naval and Nawar in Tamil, Narala in Canarese, Nareyr in Teligu, Jambool in the Bombay Presidency, and Madang in Ceylon ; the panicles of flowers are always produced from the old wood just below the shoots of new wood, and if this is borne in mind it cannot be confounded with any of the other species except E. nervosa, which has much more prominent venation ; it generally flowers in March and April and the flowers have a strong smell of honey ; the wood is much used in native house building, for cart framing, agricultural implements and a variety of purposes, it resists the action of water very well, and is used for well work, it is tolerably close and even grained, not very strong or durable except in water, and in color dirty brown (reddish when fresh), a cubic foot unseasoned weighs 60-62 *lbs. and when seasoned* 48 *lbs. and its specific gravity is* ·768.

Analysis.

1. A flower bud.
2. The same more advanced, the petals lifted up like a calyptra by the 1st expanding anther.
3. Full flower, the calyptra (petals) still adhering (though generally deciduous before this stage).
4. Anthers, front and back view.
5. Flower cut through vertically, showing the insertion of the stamens at the apex of the calyx tube, and the longitudinal section of the ovary.
6. Cross section of the ovary, showing 2 cells.
7. A fruit (All drawn from fresh specimens). This species well illustrates the Syzygium section of this genus (allied species of which are so characteristic of our higher mountain woods) the petals generally fall off in a lid though they occasionally in some species expand more or less ; the flowers are always small and insignificant, and the trees are always perfectly glabrous.



Gauge del.

G. Dumphry Lith.

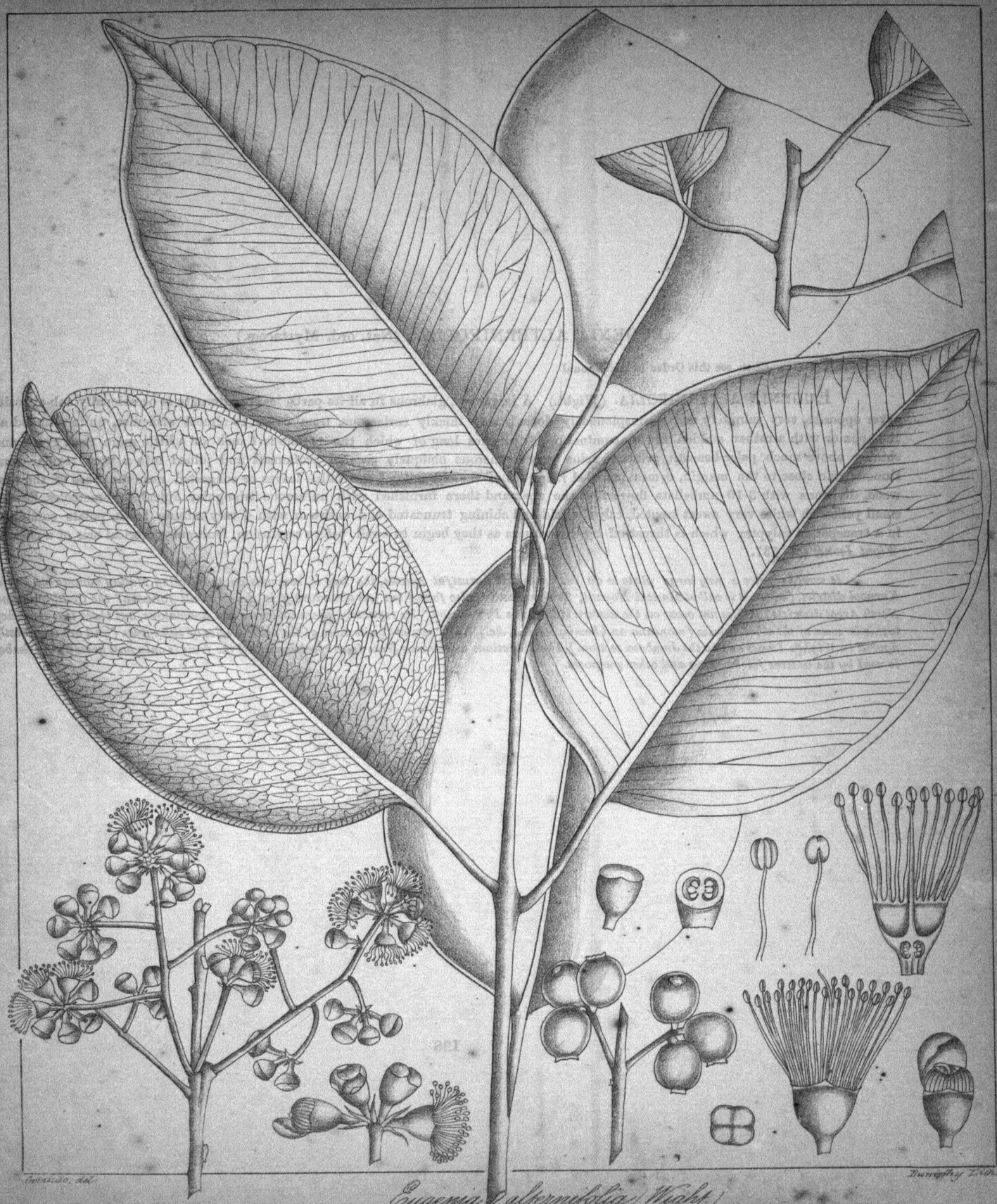
Eugenia Jambolana (Lam.)

EUGENIA ALTERNIFOLIA. (Nat. ord. Myrtaceæ.)

For Gen. Char. see this Order in the Manual.

EUGENIA ALTERNIFOLIA. (Wight.) A large tree, glabrous in all its parts, leaves alternate or occasionally sub-opposite never opposite, very minutely and inconspicuously dotted, very thickly coriaceous, from ovate to almost orbicular, quite rounded at the apex or with a rather sudden blunt acumination, 3-9 inches long of which the petiole is 1 inch or a little more, dark green and shining above much paler beneath, primary veins very numerous obliquely parallel prominent and joined into a very regular continuous vein close to the margin, cymes panicled rising from the old axils of the fallen leaves or congested near the base of the new wood, divisions with 3-10 umbellate flowers at the apex and there furnished with numerous triangular apiculate bracteoles, flowers small yellowish white very sweet scented, calyx viscid and shining truncated and entire or with 4 very minute teeth, petals combined in a transparent calyptra which is thrust off by the anthers as they begin to swell before expansion, fruit sub-spherical size of a cherry. *Wight Icones tab.* 537.

It would require a very large plate to do justice to this beautiful species, the tree is common on the Nallay Mallay mountains in the Kurnool district, (where it is called Manchi Moyadi, Teligoo) and is also found but less abundantly in the dry hill forests of the Cuddapah and North Arcot districts; it does not occur on the western side of the Presidency. Its regularly alternate leaves are anomalous, but there is a tendency to this in some of the other species (montana and hemisphœrica, &c.), its flowers are quite those of the other species of Syzygium (and are incorrectly figured in Wight's Icones as like the Jambosa section.) The dissections are drawn from fresh specimens, and the fruit is only half grown; the timber is used by the natives for building and other purposes.



Bonnisso del. Dunnigby Lith.

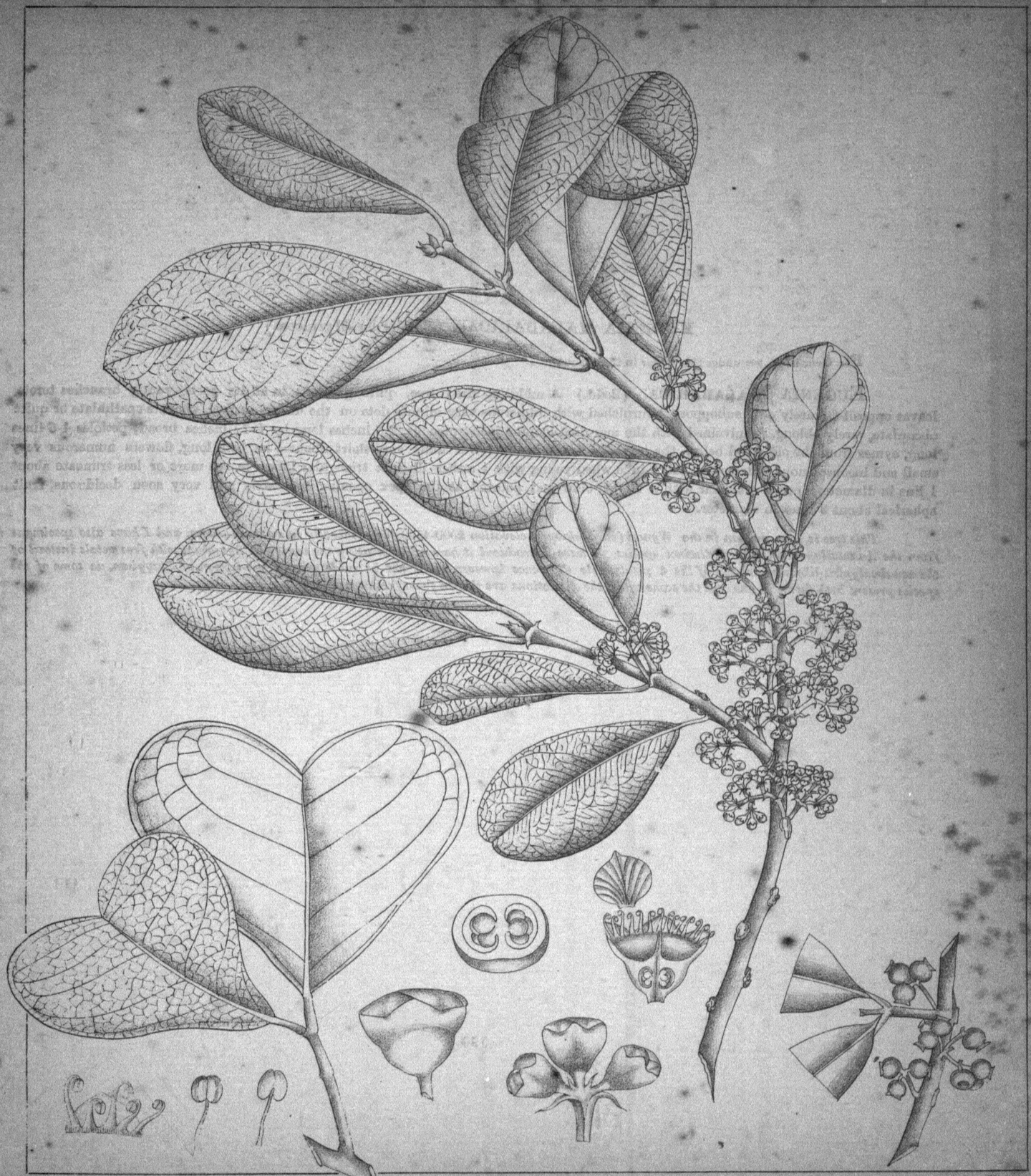
Eugenia albicifolia (Wight.)

EUGENIA MALABARICA. (Nat. order Myrtaceæ.)

For Gen. Char. see under this Order in the Manual.

EUGENIA MALABARICA. (Bedd.) A middling sized tree, quite glabrous in all its parts, young branches terete leaves opposite, (rarely only subopposite) furnished with numerous very minute dots on the under surface, obovate-spathulate or quite obcordate, rarely oblong, penniveined with the marginal looping inconspicuous, 2-5 inches long by 1-2¾ inches broad, petioles 4-6 lines long, cymes from the old wood below the leaves or rarely in the lower axils very short about ½ an inch long, flowers numerous very small and inconspicuous bracteolate, calyx-tube when young with 4 rather distinct triangular lobes, in age more or less truncate about 1 line in diameter, petals orbicular with a slight claw and pointed at the apex opening separately and very soon deciduous, fruit spherical about 3 lines in diameter.

This tree is very common in the Wynad (in Malabar), elevation 2000-4500 feet, generally in swampy places, and I have also specimens from the Anamallays: it is a very distinct species. I have introduced it here as illustrating the section of Syzygium with free petals instead of the usual calyptra-like conjunction of the 4 petals, this difference however could not be made even a sub-section of Syzygium, as some of the species present both forms in one and the same cyme, the dissections are drawn from fresh specimens.



Govindo. del. Thompson Lith.

Eugenia Malabarica (Bedd.)

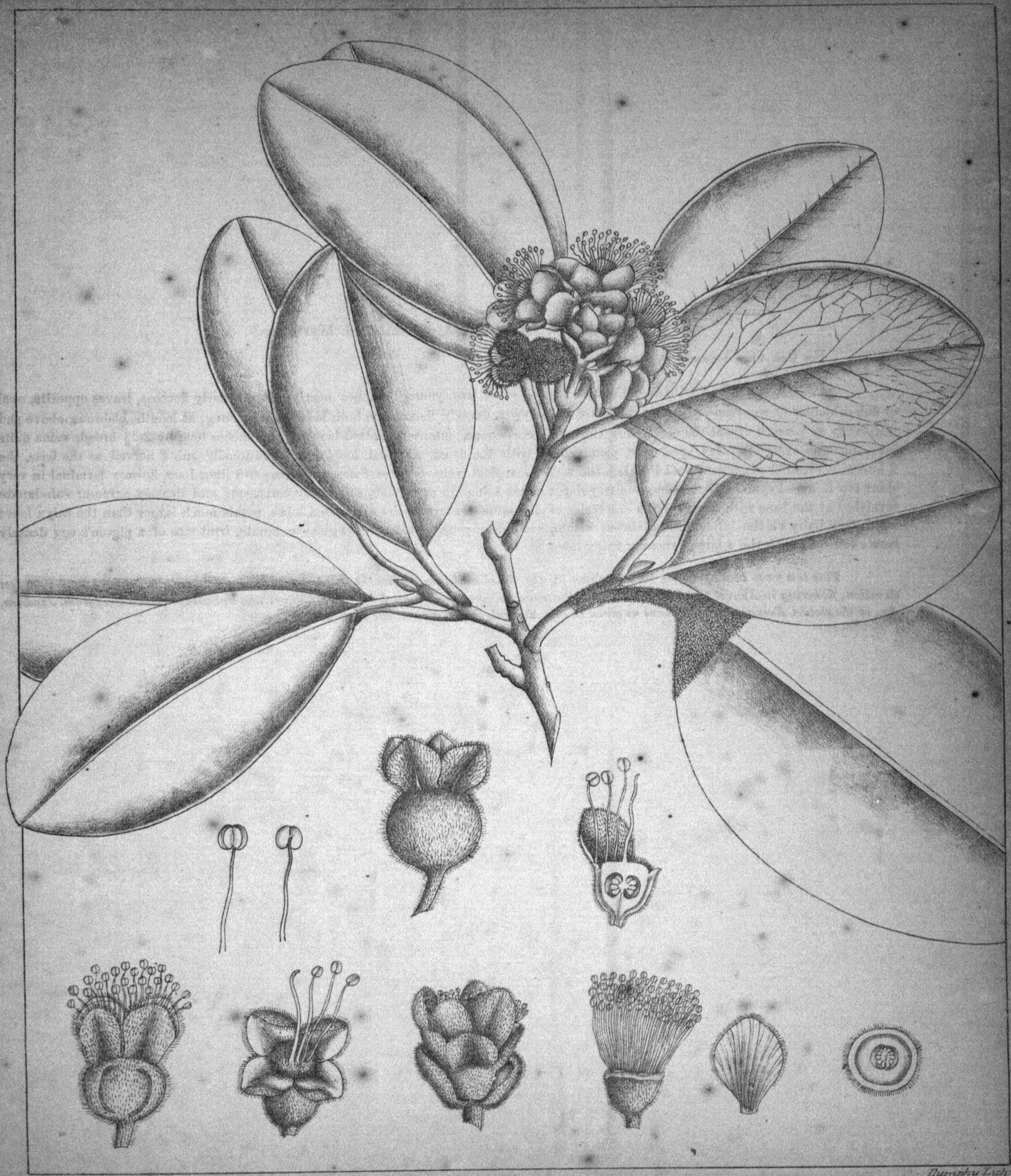
BENGAL SECRETARIAT
LIBRARY.

EUGENIA FLOCCOSA. (Nat. Ord. Myrtaceæ.)

For Gen. Char. see under this Order in the Manual.

EUGENIA FLOCCOSA. (Bedd.) A good sized tree, young branches nearly terete densely floccose, leaves opposite, oval or sub-orbicular or sometimes lanceolate obtuse at the apex, densely floccose on both sides when young, at length glabrous above and ultimately so beneath except the costa, very thick and coriaceous, minutely dotted beneath, 3-5 inches long by 2-3½ broad, veins quite inconspicuous except in dried specimens, penniveined with the usual marginal looping or occasionally sub 3 nerved at the base, the 2 lateral nerves not prominent and forming the waved marginal vein, petioles densely floccose 6-8 lines long, flowers terminal in very short few flowered cymes or sometimes solitary large about 1 inch in expansion, calyx very coriaceous and densely aureo-or rufo-lanate furnished at the base with 2 very large bracteoles of the same texture as the 4 rounded lobes, petals much larger than the calyx lobes white very hairy on the outside subglabrous within, soon deciduous, disk large sub-globose lanate, fruit size of a pigeon's egg densely lanate crowned with the 4 large orbicular calyx lobes.

This is a most beautiful tree very common in the dense moist woods on the South Tinnevelly ghats (above Caload) 3000-4000 *feet elevation, flowering in August and September; this illustrates the restricted genus Eugenia of authors who uphold the genera Syzygium, Jambosa, &c., or the section Eueugenia of the genus as given in this Manual, the dissections are from flowers in spirit.*



Govinda del. Beverley Lith.

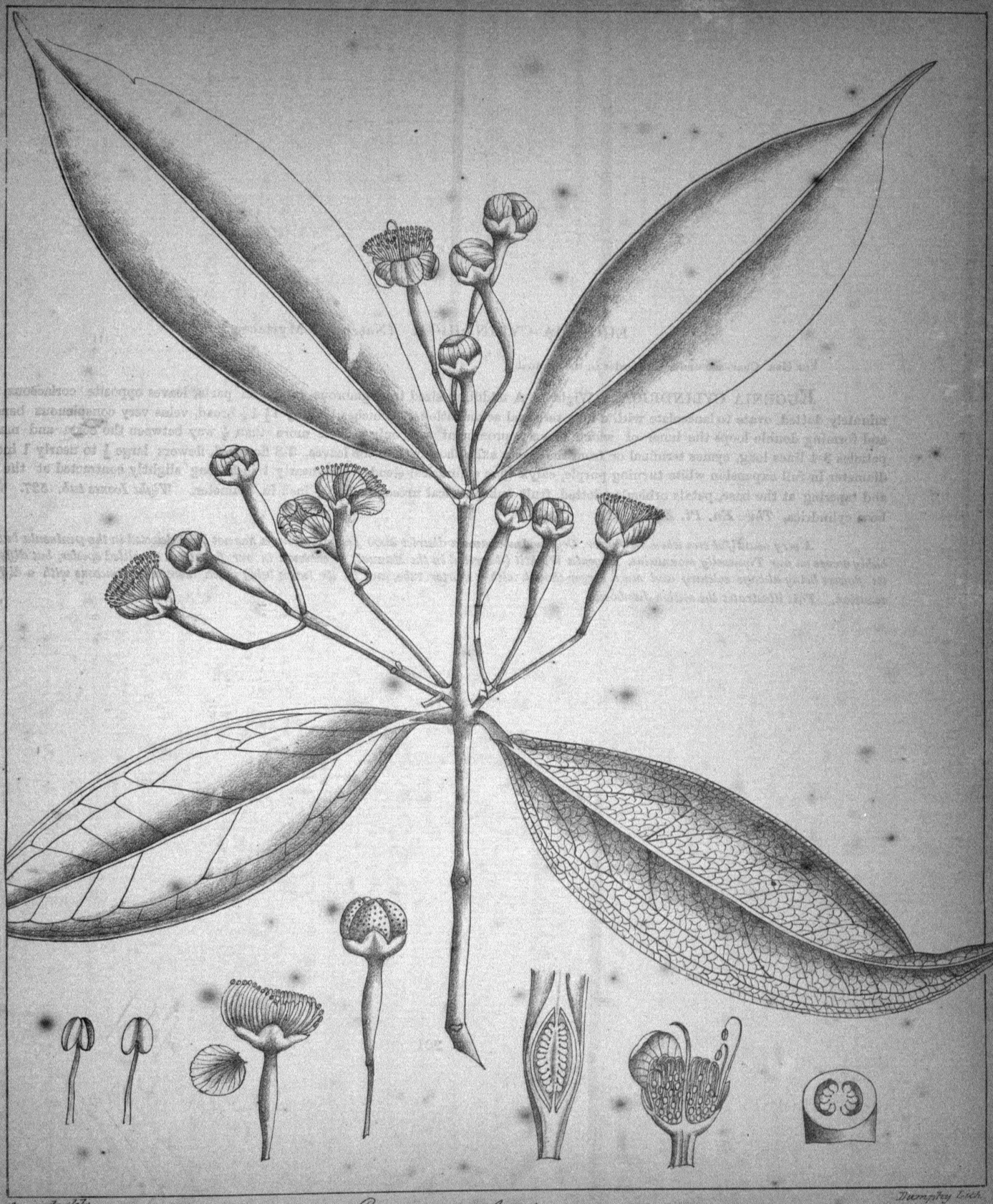
Eugenia floccosa, Bedd.

EUGENIA CYLINDRICA. (Nat. order Myrtaceæ.)

For Gen Char see under this Order in the Manual

EUGENIA CYLINDRICA. (Wight) A middling sized tree, glabrous in all its parts, leaves opposite coriaceous, very minutely dotted, ovate to lanceolate with a long terminal acumination, 4-6 inches long by $1\frac{1}{2}$-$1\frac{3}{4}$ broad, veins very conspicuous beneath, and forming double loops the inner of which is very prominent and only a little more than $\frac{1}{2}$ way between the costa and margin, petioles 3-4 lines long, cymes terminal or from the upper axils shorter than the leaves, 3-8 flowered, flowers large $\frac{1}{2}$ to nearly 1 inch in diameter in full expansion white turning purple, calyx tube cylindrical slender $\frac{3}{4}$ to nearly 1 inch long slightly contracted at the apex and tapering at the base, petals orbicular dotted, fruit subsphærical urceolate $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter. *Wight Icones tab.* 527. Jambosa cylindrica, *Thw. En. Pl. Zey. p.* 115.

A very beautiful tree when in flower, Ceylon Ambaganwa district 3000 *feet elevation, it has not been detected in the peninsula but probably occurs on our Tinnevelly mountains. Eugenia Wightii (described in the Manual) so common in our forests, is an allied species, but differs in its flowers being always solitary and much larger though with a shorter tube, and in its leaves being much more membranceous with a different venation. This illustrates the section Jambosa.*



Govindo, del. Humphrey Lith.

Eugenia cylindrica (Wight)

EUGENIA ZEYLANICA. (Nat. order Myrtaceæ.)

For Gen. Char. see under this Order in the Manual

EUGENIA ZEYLANICA. (Wight.) A small or middling sized tree, glabrous in all its parts, leaves opposite rarely alternate or subalternate, densely glanduloso-punctate, very variable in shape from narrow linear to ovato-lanceolate ; 1-4 inches long by 1½ to 10 lines broad, veins penniveined very inconspicuous, petioles 1-4 lines long, cymes axillary and terminal dense many flowered, shorter than the leaves, flowers white conspicuous about ½ an inch long, calyx-tube glandular and sometimes pruinose, elongato-turbinate, lobes 4-5, rather conspicuous triangular, petals crenated very early deciduous, opening separately or falling off in a calyptra. *Wight's Ill.* ii. *p.* 15. Acmena Zeylanica, *Thw. En. Pl. Zey. p.* 118.

Var. B. laxiflora flowers in lax few-flowered cymes, panicles longer than the leaves.

This tree is common on the South Tinnevelly mountains up to 3500 *feet where it generally affects beds of rivers, and in Ceylon where it is called Morang; it is very beautiful when in full flower. This illustrates the Acmena section of Eugenia, which only differs from Syzygium in its long calyx-tube.*

Variety B. has exactly the foliage and flowers of the ordinary form, and only differs in its longer lax cymes

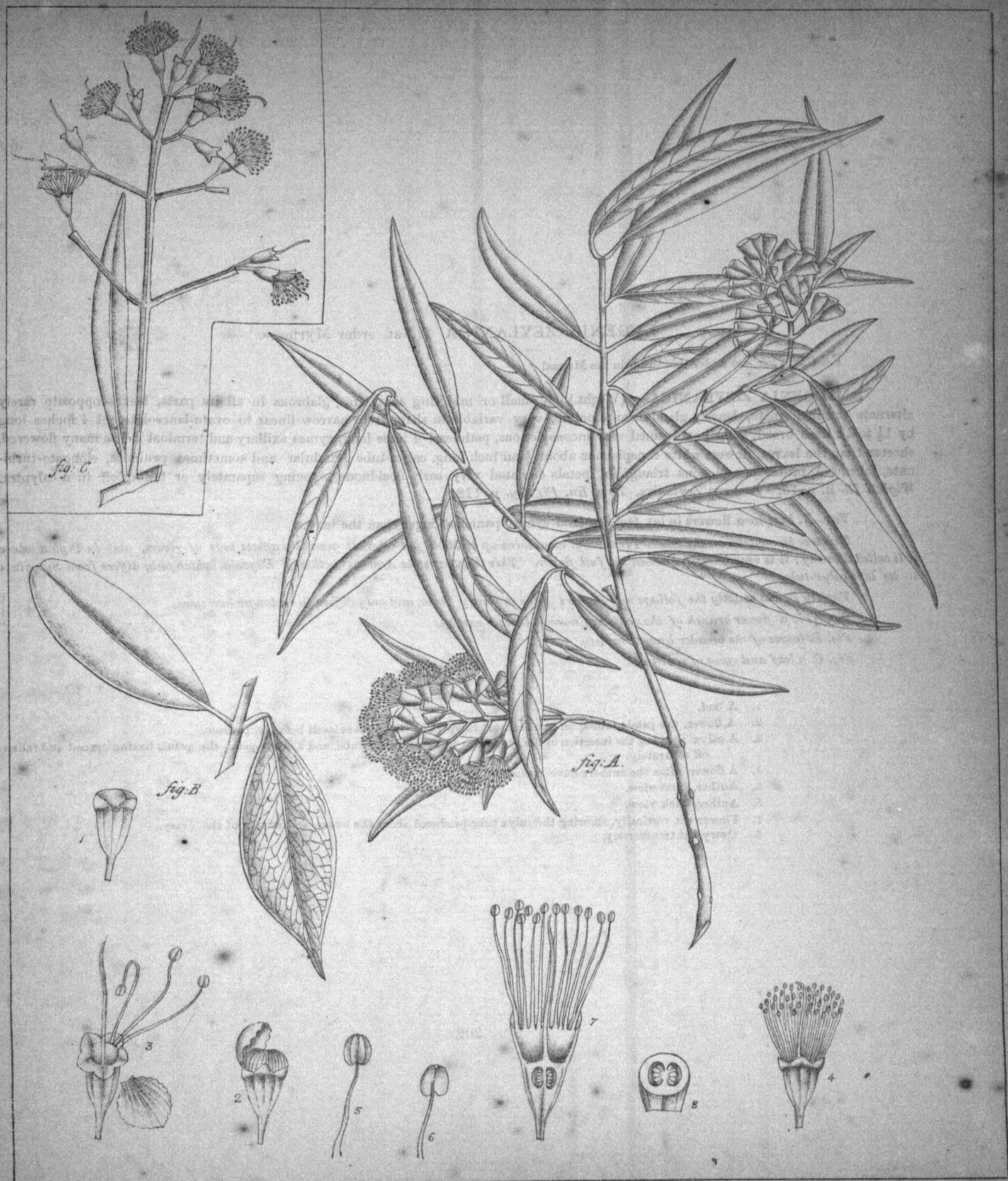
Fig. A. is a flower branch of the ordinary narrow leaved variety.

Fig. B. leaves of the broader leaved variety.

Fig. C. a leaf and cyme of variety B.

Analysis.

1. A bud.
2. A flower, the petals falling off in a crenated calyptra as the anthers swell before expansion.
3. A calyx showing the insertion of the anthers at the apex of the tube, and a single petal, the petals having opened and fallen off separately.
4. A flower after the anthers have opened out.
5. Anther, front view.
6. Anther, back view.
7. Flower cut vertically, showing the calyx tube produced above the ovary, and section of the ovary.
8. Ovary cut transversely.



Govindo: del.

Dumphy, Lith.

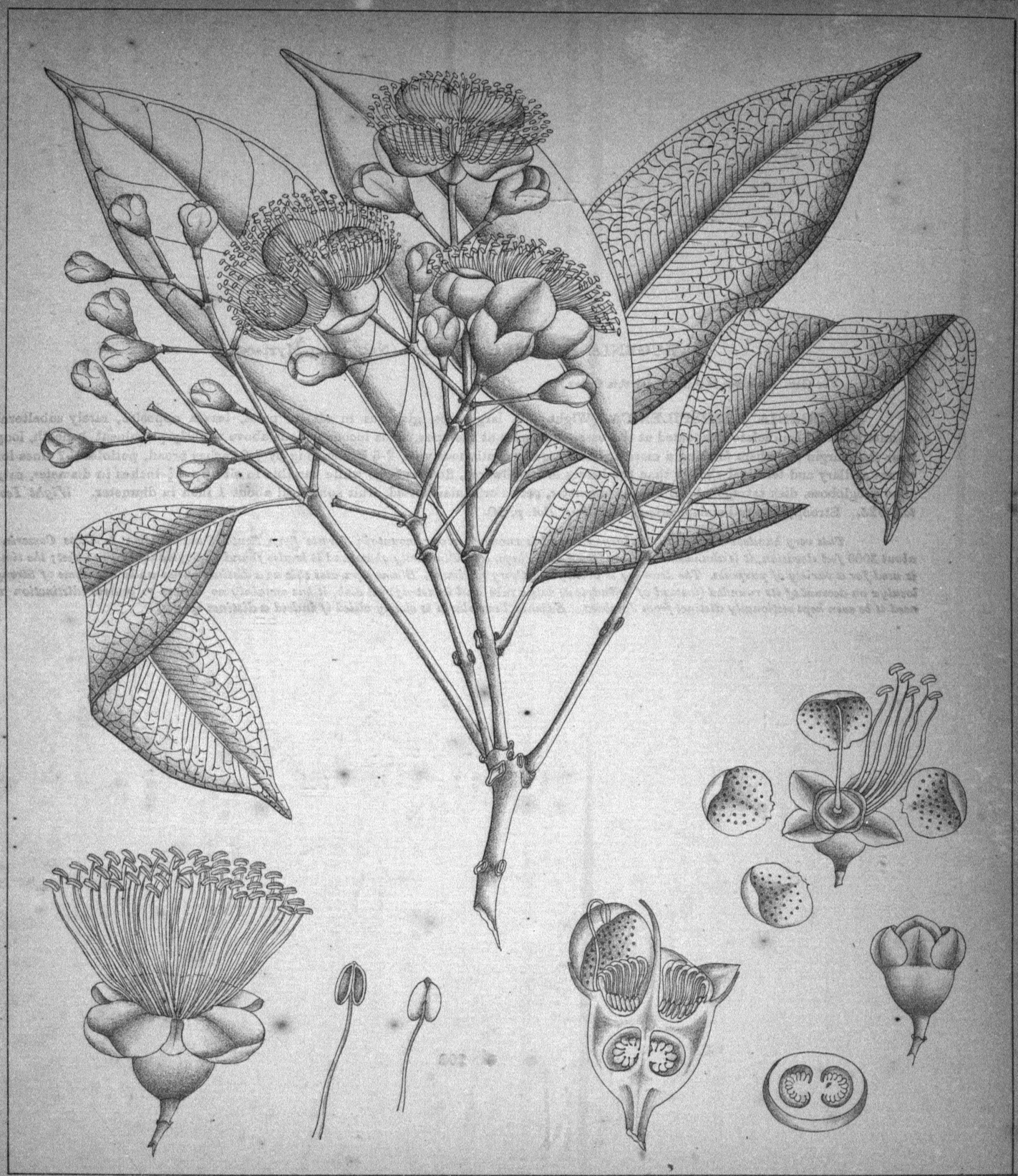
Eugenia Zeylanica (Wight)

EUGENIA HEMISPHÆRICA. (Nat. order Myrtaceæ.)

For Gen. Char. see Manual under this Order.

EUGENIA HEMISPHÆRICA. (Wight.) A large tree, glabrous in all its parts, leaves opposite, rarely subalternate minutely dotted lanceolate attenuated at the base, acuminate at the apex, veins inconspicuous above slightly prominent beneath, looped near the margin and there forming a more or less irregular continuous vein, 2-6 inches long by $\frac{3}{4}$-2 inches broad, petioles 6-7 lines long, cymes axillary and terminal shorter than the leaves many flowered, flowers large white variable in size up $1\frac{1}{2}$ inches in diameter, calyx-tube subglobose, disk tetragonal 4-5 lines in diameter, petals orbicular dotted, fruit sphærical about 1 inch in diameter. *Wight Icones tab.* 525. Strongylocalyx hemisphæricus, *Bl. Mus. Bot. p.* 90.

This very handsome tree attains a large size and is common in our mountain forests from South Canara down to Cape Comorin at about 3000 *feet elevation, it is abundant in Coorg, the Anamullays, and Tinnevelly ghats, and it is also found in Ceylon up to* 4000 *feet; the timber is used for a variety of purposes. The drawing is taken from Coorg specimens. Blume separates this as a distinct genus under the name of Strongylocalyx on account of its rounded (instead of cylindrical) calyx tube and its tetragonal disk, it has certainly no claims to generic distinction nor need it be even kept sectionally distinct from Jambosa. Eugenia lanceolaria is closely allied if indeed a distinct species.*



Govindo, del.: Dempsey Lith.

Eugenia hemisphaerica, (Wight)

BARRINGTONIA ACUTANGULA. (Nat. order Myrtaceæ.)

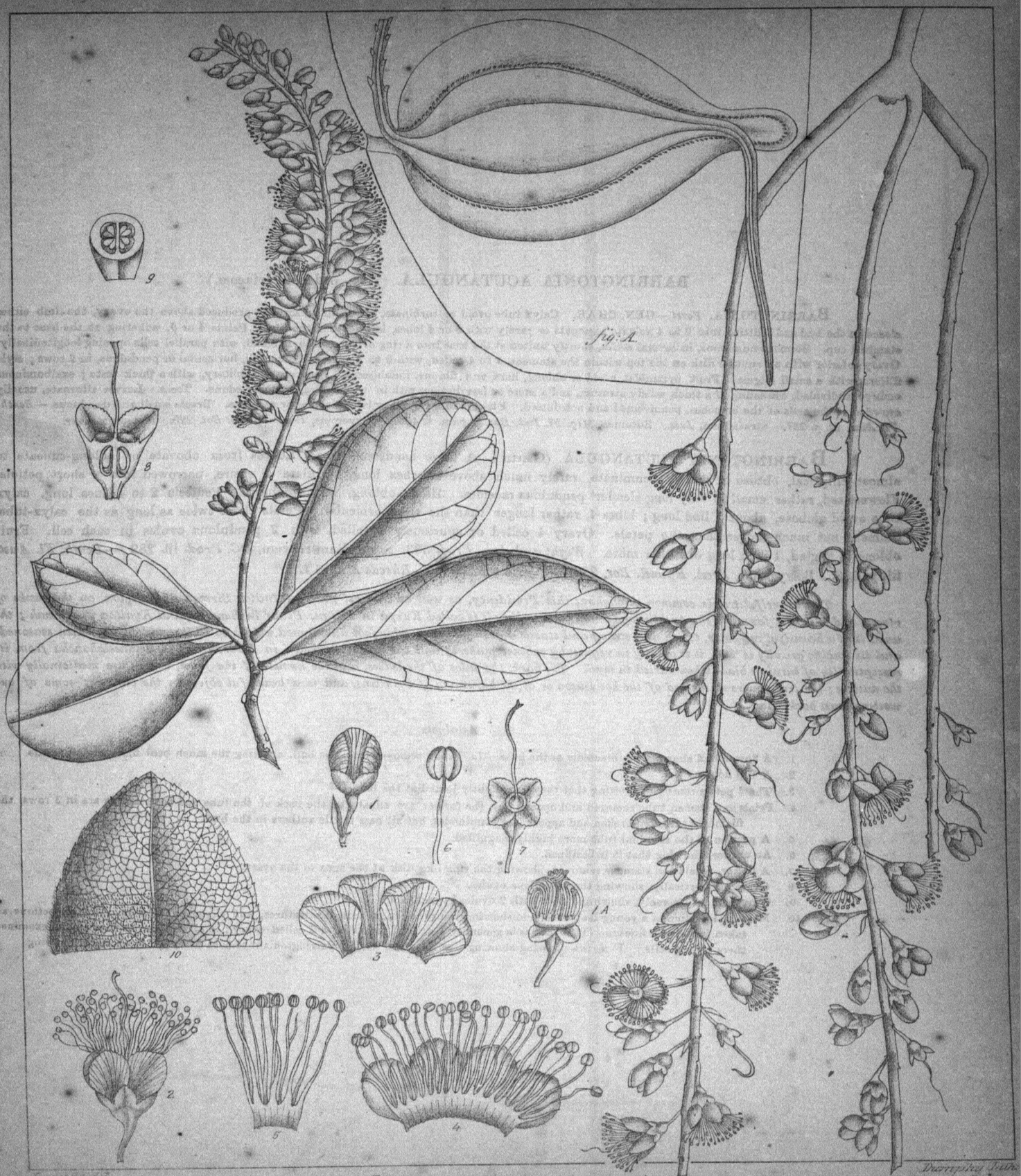
BARRINGTONIA. *Forst.*—GEN. CHAR. Calyx tube ovoid or turbinate, not at all or scarcely produced above the ovary, the limb either closed in the bud and splitting into 2 to 4 valvate segments or rarely with 3 or 4 lobes, imbricate in the bud. Petals 4 or 5, adhering at the base to the staminal cup. Stamens numerous, in several series, shortly united at the base into a ring or cup; anthers small, with parallel cells opening longitudinally. Ovary inferior with an annular disk on the top within the stamens, 2 to 4 celled, with 2 to 8 ovules in each cell, horizontal or pendulous, in 2 rows; style filiform with a small stigma. Fruit pyramidal ovoid or oblong, hard and fibrous, indehiscent. Seed usually solitary, with a thick testa; exalbuminous embryo undivided, consisting of a thick woody stratum, and a more or less distinct pith in the centre, no cotyledons. Trees. Leaves alternate, usually crowded at the ends of the branches, penninerved and not dotted. Flowers in terminal or lateral spikes or racemes. Bracts small and deciduous.—*Benth. Fl. Aust.* iii. *p.* 287. Stravadium, *Juss.* Butonica, *Mig. Fl. Ind. Bat.* 1. *pars.* 1. 485. Botryoropis, *Presl Epimel. Bot.* 220. Meteorus, *Lour.*

BARRINGTONIA ACUTANGULA. (Gærtn.) A large handsome tree. Leaves from obovate or oblong-cuneate to almost elliptical, obtuse or shortly acuminate, rarely much above 4 inches long, serrulate or entire, narrowed into a short petiole. Flowers red, rather small in very long slender pendulous racemes. Bracts oblong, very deciduous. Pedicels 2 to 4 lines long, calyx tube ovoid globose, about 1 line long; lobes 4, rather longer than the tube, orbicular. Petals about twice as long as the calyx-tube. Stamens not much longer than the petals. Ovary 4 celled or spuriously 4 celled, with 2 pendulous ovules in each cell. Fruit oblong, 4 angled, 1 inch long or rather more. *Wight and Arn. Prod.* 333. Stravadium rubrum, *DC. Prod.* iii. 289;—*Benth. Fl. Aust.* iii. *p.* 288. Botryoropis, *Presl. Epimel. Bot.* 220. Tsjeria samstravadi, *Rheede Mal.* 4 *t.* 7.

This beautiful tree is common throughout this Presidency, as well as in most parts of India, Birmah and Ceylon, on the banks of rivers, and it is also found in the Archipelago and in Australia; it is called Kurpà in Teligu, Piwar in Bombay, and Kyaitha in Birmah; the wood is of a beautiful red color, tough and strong and stands a good polish, a cubic foot unseasoned weighs 65-70 *lbs. and* 56 *lbs. when seasoned, and its specific gravity is* ·896, *it is greatly in request by cabinet makers, and the native workmen in Madras call it Munneelahancha from its susceptibility of turning black when buried in mud. The bark, the juice of the leaves, and the kernels of the fruit, are in use medicinally with the natives; the tree flowers at the end of the hot season or at the beginning of the rains, and is a beautiful object on the banks of some of our western coast backwaters.*

Analysis.

1. A flower bud showing the bracteole at the base.—1*a*. Petals removed from the bud, showing the much bent filaments all fertile.
2. A full flower.
3. The 4 petals removed, showing that they are slightly joined at the base.
4. Petals and stamen tube removed and opened out, the former are adnate to the back of the tube and the stamens are in 3 rows, the filaments are often broken and appear like staminodes, but all bear fertile anthers in the bud.
5. A portion of the staminal tube more highly magnified.
6. An anther, showing that it is basifixed.
7. A flower, petals and stamens removed, showing the ring-like disk at the apex of the ovary.
8. Ovary cut vertically, showing the pendulous ovules.
9. Ovary cut transversely, showing 4 cells with 2 ovules in each cell.
10. Magnified portion of a young leaf underside showing the venation, the small serratures, and slight pubescence. The dissections all taken from fresh flowers. (This species is generally described as having a 2 celled ovary; in all the ovaries that I have examined there were 4 cells.) F. *a*. is a drawing showing a germinating seed of Barringtonia racemosa after Dr Roxburgh's drawing.



Barringtonia acutangula (Gaertn.)

ORDER XXXVIII—MYRTACEÆ.

Calyx-tube adnate to the ovary at the base or up to the insertion of the stamens; limb more or less divided (usually to the base) into 4 or 5 very rarely 3 or more than 5 lobes or teeth, or reduced to a narrow border, or entirely wanting; lobes usually imbricate or open in the bud. Petals usually as many as calyx-lobes, very much imbricate in the bud, the external one sometimes larger than the others but usually all nearly equal when expanded, sometimes all concrete and falling off in a single operculum, or rarely entirely wanting. Stamens indefinite, usually numerous or rarely few and definite, inserted in one or several rows on a disk, either thin and lining the calyx-tube above the ovary and forming a thickened ring at its orifice or thicker and forming a ring close round the summit of the ovary; filaments free or rarely united into a ring or tube at the base, or into as many bundles as there are calyx-lobes; anthers 2-celled, versatile or attached by the base, the cells opening in longitudinal slits, or rarely in terminal pores. Ovary inferior or rarely almost superior, but enclosed in the calyx-tube, sometimes 1-celled, with a placenta attached to the base or adnate to one side, more frequently 2 or more celled, with the placentas in the inner angle of each cell, very rarely 1-celled, with 2 parietal placentas. Style simple, with a small or a capitate or peltate, very rarely lobed stigma. Ovules 2 or more to each placenta, in 2 or more rows, or very rarely solitary, erect pendulous or laterally attached, anatropous or amphitropous. Fruit inferior, adnate to the calyx-tube, and crowned by the persistent limb or marked by its scar when deciduous, or very rarely half or almost wholly superior, and surrounded at the base by the persistent calyx tube, either capsular and opening loculicidally at the summit, in as many valves as cells, or indehiscent, dry, and 1-seeded, or succulent and indehiscent. Perfect seeds usually very few or solitary in each cell, even when the ovules are numerous, or rarely numerous and perfect; testa either thin and membranous or crustaceous, fleshy or bony. Albumen none, or very scanty near the hilum. Embryo straight or variously curved, fleshy with minute cotyledons at one end, or with large flat, or variously folded cotyledons, or with thick fleshy distinct or consolidated cotyledons, and an exceedingly short radicle, or rarely apparently homogeneous, the cotyledons inconspicuous before germination. Abortive ovules in many capsular genera enlarged without being fertilized and simulating the seeds, but of a hard nearly homogeneous, woody or granular consistence. Trees or shrubs, very rarely undershrubs. Leaves simple, entire or rarely obscurely crenate-toothed, opposite or less frequently alternate, more or less dotted in all but most of the *Lecythideæ*, with small resinous glands, either pellucid or black and superficial, often scarcely visible when the leaf is thick. Stipules none or rarely very minute and fugacious. Flowers solitary or in racemes, panicles or cymes, axillary or apparently terminal from the terminal bud not gowing out till after the flowering is over. Bracts solitary at the base of the peduncles, or forming an imbricate involucre from the abortion of the lower flowers. Bracteoles 2 at the base of or on the pedicel, sometimes very small or abortive, and often exceedingly deciduous.

Tribe I, Myrteæ.—Ovary divided into 2 or more cells or very rarely 1 celled with 2 parietal placentas, fruit an indehiscent berry or rarely a drupe indehiscent, leaves opposite or very rarely alternate.

Ovary with 2-4 or 6 rows of superposed ovules separated by vertical septa, the ovules themselves separated by transverse septa (1-2 or 3-celled with double rows of ovules in each cell all separated by spurious septa) ..	RHODOMYRTUS.
Ovary 2 or rarely 3 celled with many rarely 2-ovules in each cell, embryo thick and fleshy either indivisible or with 2 thick fleshy cotyledons and a short radicle	EUGENIA.

Tribe II, Lecythideæ. (Sub-tribe Barringtonieæ.)—Ovary divided more or less completely into 2 or more cells, fruit indehiscent hard and fibrous or fleshy, leaves alternate or crowded at the ends of the branches, large, very rarely dotted.

Stamens all perfect, fruit angular fibrous with a single seed	BARRINGTONIA.
Outer or inner stamens or both without anthers, fruit ovoid or globular not angular with several seeds in pulp...	CAREYA.

The tribe Myrteæ, or rather the genus Eugenia, is a most important one to the forester, as the latter gives 50 or 60 species of trees or large shrubs most of them being valuable timber, they are generally known by the native name of Naval; a few are found in the plains, but they are most characteristic of the moist woods or sholas on our higher mountains. Rhodomyrtus has only 1 species, a large shrub common on our higher mountains, and to this tribe belongs the Guava (Psidium Guyava, Linn.) so common in our gardens, but an introduction from tropical America, and also Rhodamnia spectabilis (Monoxa, Wight Icones tab. 524.) Nelitris paniculata (Wight Icones tab 521) and Pimenta acris (Wight Ill. vol. ii. tab. 97) trees introduced into our gardens and of Asiatic origin, though not indigenous to the Peninsula.

The tribe Lecythideæ yields 3 species of Barringtonia, handsome trees confined to the plains or at no great elevation, and commonest near the sea, all valuable timber; and one species of Careya, a good sized tree most abundant throughout the presidency and ascending the hills to 5000 feet elevation and also yielding a good timber.

Very numerous species of trees and shrubs belonging to this order have been introduced on our mountain ranges from Australia, the most important of which are the Eucalypti, which belong to the tribe Leptospermeæ (differing from Myrteæ in their fruit opening at the summit in as many valves as there are cells), the Eucalyptus globulous (blue gum) and E. obliqua (Stringy bark) are the most common of these, and they impart quite a new feature to the scenery on our mountains; most of the species yield valuable timbers; to the same tribe belong the Leptospermum and Melaleucas bottle brushes), very ornamental shrubs, many species of which now grow in our hill gardens.

RHODOMYRTUS. DC.

Gen. Char. Calyx-tube turbinate, oblong or nearly globular, scarcely or not at all produced above the ovary; lobes 4 or 5, herbaceous, persistent. Petals 4 or 5, spreading. Stamens numerous in several series, free; filaments filiform; anthers versatile or attached near the base, with parallel cells opening longitudinally. Ovary really 1-2-or 3-celled, with several ovules in 2 rows in each cell, but owing to spurious dissepiments interposed between the ovules, appearing either 2-4-or 6 celled or divided into numerous 1-ovulated cells superposed in 2, 4, or 6 rows; style filiform with the stigma usually peltate. Fruit a berry or almost a drupe, globular, ovoid, or cylindrical, divided into 1-seeded cells or nuts superposed in 2 to 6 or almost in a single row. Seeds compressed, reniform, or nearly orbicular, with a hard testa, embryo horse-shoe-shaped or ring shaped, with a long radicle and very small cotyledons. Trees or shrubs more or less tomentose or villous. Leaves opposite, penniveined or triplinerved. Peduncles axillary, bearing 1 or 3

or rarely a raceme or cyme of 5 or more flowers, pink or white. Bracts small, or when the peduncles are several-flowered the lowest sometimes leaf-like. Bracteoles small and deciduous. *Benth. Fl. Aust.* iii. *p.* 271.

1. RHODOMYRTUS TOMENTOSA, *DC.*—A large shrub, the branches, the under surface of the leaves, the peduncles and calyx hoary with a very short soft tomentum, leaves oval-elliptic obtuse 1-2½ inches long with 3 or rarely 5 thick prominent nerves starting from near the base, peduncles axillary shorter than the leaves bearing 1-3 rather large pink flowers. Calyx tomentose with 2 small bracts at the base, petals ½-¾ inch in diameter tomentose outside. *DC. Prod.* iii. 240 ;—*Wight Icones t.* 522.

Abundant on the higher mountains in this presidency and in Ceylon, at Ootacamund it is known as the hill gooseberry and the fruit is eaten raw or made into jams, &c., it is called by the Burghers Thaoutay ; the wood is white with a pink heart, close grained and dense, cuts like cheese but splits in seasoning, it is excellent for small turnery purposes.

Analysis of Genera, Pl. XIV, fig. 3.

RHODOMYRTUS TOMENTOSA.

1. A piece of a branch in fruit.
2. Under surface of a leaf.
3. A full flower.
4. A petal, inside view.
5. The same, outside.
6. Anthers, front and back view.
7. Style.
8. Flower cut vertically, showing the insertion of the stamens, and the ovary with transverse spurious cells 3 on each side, (there are sometimes 4-6).
9. A fruit cut vertically.
10. The same cut transversely.

EUGENIA. LINN.

Gen. Char. Calyx-tube from globular to narrow-turbinate, not at all or more or less produced above the ovary; lobes 4, very rarely 5, from large and imbricate to very short and scarcely prominent above the truncate margin. Petals 4, very rarely 5, either free and spreading, or more or less connivent or connate, and falling off in a single calyptra. Stamens numerous, in several series, free or obscurely collected in 4 bundles ; anthers versatile, usually small, the cells parallel or very rarely divaricate, opening longitudinally. Ovary 2-celled or very rarely 3-celled, with several ovules in each cell, or only 2 (in an American section). Fruit a berry or sometimes almost a drupe, or nearly dry with fibrous rind. Seeds either solitary and globose, or few and variously-shaped by compression ; testa membranous or cartilaginous, embryo thick and fleshy, with a very short radicle, the cotyledons either united in an apparently homogeneous mass or more or less separable. Trees or shrubs. Leaves opposite, penniveined. Flowers either solitary in the axils, or in lateral or terminal trichotomous cymes or panicles. *Benth Fl. Aust.* iii. 280. Jossinea, *Comm.* Jambosa, *DC.* Syzygium, *Gærtn.* Acmena, *DC.* Strongylocalyx, *Bl.* Gelpkea, *Bl.* Cleistocalyx, *Bl.* Cerocarpus, *Hassk.* Macromyrtus, *Mig. Fl. Ind. Bat.* Microjambosa, *Bl.* Caryophyllus, *Linn.* Greggia, *Gærtn.* Guapurium, *Juss.* Syllysium, *Mey. and Schau.* Plinia, *Linn.* Phyllocalyx, *Berg.* Catinga, *Aubl.* Hexachlamys, *Berg.* Myrciaria, *Berg.* Siphoneugenia, *Berg.*

The different sections, Syzygium, Acmena, Strongylocalyx, Jambosa and Eugenia, have till lately been treated by most botanists as separate genera. The Syzygiums are most abundant in all our mountain woods, and many of them are very large trees, always glabrous, yielding most valuable timber ; they are distinguished by their small flowers and by the petals generally cohering and falling off like a lid. The Acmenas only differ from Syzygium in their calyx tube being elongated and tapering at the base ; they are small trees, very showy when in blossom. Jambosa, Strongylocalyx and Eugenia have free and spreading petals, the 2 former are glabrous and have their flowers in trichotomous panicles or cymes (except Wightii), and the calyx tube more or less produced above the ovary, prominently lobed and the lobes generally persistent ; the last named are almost always more or less downy in their young parts and have short generally 1 flowered or rarely 3 flowered pedicels, solitary or 2 together in the axils or at the old nodes, calyx tube not at all or scarcely produced above the ovary. The Jambosas are beautiful trees in the moist mountain forests generally at no great elevation, and Strongylocalyx is a fine large mountain tree ; the trees of the Eugenia section are generally small and not of such value as the Syzygiums. Eugenia floccosa is a very beautiful tree characteristic of the S. Tinnevelly mountains.

SECTION SYZYGIUM.—*Flowers in trichotomous panicles or cymes, calyx tube more or less produced above the ovary, the border entire or very shortly sinuately lobed or with more prominent but very deciduous lobes, petals more or less cohering in a calyptra and falling off together. rarely spreading and separately deciduous, flowers small and inconspicuous. Perfectly glabrous trees or large shrubs.*

1. EUGENIA JAMBOLANA, *Linn.*—For description, &c. see Pl. cxovii.

2. EUGENIA NERVOSA, *DC.*—A very large tree, quite glabrous, leaves ovate or oval-elliptic, obtuse or shortly acuminate, 3-6 inches long usually of a pale green, the principal lateral veins distant from each other and very prominent underneath, panicles usually arising from the leafless nodes of the former year's wood, 3-4 inches long, very spreadingly branched from the base, the flowers usually 3 together, sessile at the ends of the ultimate branches, calyx not distinctly toothed, berry very juicy.—Syzygium nervosum, *DC. Prod.* iii. 260 not E. nervosa, *DC. p.* 284 ;—*Benth. Fl. Hongkong p.* 119. Eugenia operculata, *Roxb.* ;—*Wight Icones* 552. E. Paniala, *Roxb.* ;—*Wight. Icones* 615, and E. cerasoides, *Roxb.* ;—*Wight Icones* 616. Syzygium nodosum, costatum and angkolanum, *Mig. Fl. Ned. Ind.* i. 448.—Nearly allied to Jambolana in habit and inflorescence, but with fewer and much more prominent veins, shorter petioles, and larger flowers.

This large and valuable timber tree is found at low elevations on the mountains on the west side of this Presidency and in Ceylon up to 3000 feet, its timber is similar to that of Jambolana and useful for building purposes, &c. The tree is widely spread over India and the Archipelago and in S. China.

3. EUGENIA CALOPHYLLIFOLIA, *Wight.*—A large spreading tree with a fine umbrageous head, young branches 4 sided, leaves glabrous oval obtuse obovate or orbicular, very coriaceous, about 1 inch long by ¾ inch broad, veins parallel but inconspicuous, reticulated beneath when dry, not dotted, cymes terminal corymbose short peduncled many flowered, calyx repandly 4 toothed, petals orbicular falling off as a single lid, fruit oval oblong succulent dark purple, edible. *Wight Icones tab.* 1000.

A large beautiful tree abundant in the moist woods on the higher ranges of the Nilgiris and in Ceylon (Adam's Peak), its very small Calophyllum-like thick leaves distinguish it from all the other species, its timber is valuable and used for building and other purposes, it is in flower more or less all the year round.

4. EUGENIA ARNOTTIANA, *Wight.*—A very large spreading tree but with a low trunk, leaves glabrous elliptic with a longish acumination coriaceous shining obscurely dotted, 2-3 inches long by 1-1½ inches broad, petioles ½ to nearly 1 inch long, cymes terminal dense corymbose, the peduncle and its branches acutely or obtusely 4 sided, flowers cream-colored numerous small sessile or subsessile (when in bud of a lively crimson), bracteoles long ovate lanceolate crimson very caducous, calyx shortly turbinate, limb cup-shaped shortly and bluntly 4 toothed or subentire, petals falling off in a lid or expanding and falling off separately, fruit oblong oval dark purple succulent. *Wight Icones tab.* 999. Syzygium densiflorum, *Wall.*;—*WA. Prod. p.* 329.

This is one of the largest and commonest trees in the moist woods on the Nilgiris and Pulneys, 6-7000 feet elevation, and I also have it from 4000 feet on the Anamallays; it is a valuable timber and generally known under the name of Nawal, the fruit is eaten but it is very astringent.

5. EUGENIA ASSIMILIS, *Thw.*—A middling sized tree, leaves glabrous lanceolate to obovate, or broadly oval abruptly acuminate or obtuse narrowed or rounded at the base, 2-5 inches long by 1¼-3 inches broad, petioles 2-7 lines long, cymes crowded at the apex of the branches or in the upper axils ½ or less than ½ the length of the leaves, peduncles obtusely 4 sided, flowers rather large, 6-7 lines in diameter, petals falling off in a lid, fruit spherical blackish purple about ¾ inch in diameter.—*Thw. En. Pl. Zey. p.* 116.

Ceylon, central provinces, up to 5000 feet elevation, the leaves are larger and the flowers 3 times larger than in Arnottiana, and the fruit differs in shape.

6. EUGENIA MONTANA, *Wight.*—A very large tree, young shoots acutely 4 angled winged and concave between the wings, leaves occasionally alternate or subalternate coriaceous glabrous lanceolate with a short blunt acumination to obovate or orbicular obtuse, 5-6 inches long by about 2½ broad, petioles 3-5 lines long, cymes terminal very numerous corymbose many flowered, peduncles angled and often very flat and broad, flowers small sessile or subsessile in threes at the apex of each extreme division, calyx obtusely 4 lobed, petals adhering and falling off as a lid, fruit globose purple size of a currant crowned by the calyx. *Wight Icones tab.* 1060.

A very common tree in the woods of the higher ranges of the Nilgiris, the leaves are often alternate or subalternate; it is to be met with in flower at all seasons; the wood is in use for building purposes, &c.

7. EUGENIA SYLVESTRIS, *Moon.*—A very large tree, leaves glabrous from lanceolate with a blunt point to obovate or spathulate obtuse coriaceous, about four inches long by 1½-2½ broad, petioles ¾ inch long, cymes corymbose terminal crowded or from the extreme axils longish peduncled, flowers very small, fruit spherical black purple ½ inch in diameter. *Wight Icones tab.* 532.

Ceylon, up to 3000 feet elevation, called Aloobo.

8. EUGENIA NEESIANA, *Arnt.*—A good sized tree, leaves subsessile or petiolate oblong lanceolate blunt pointed subcoriaceous pellucid dotted, penniveined, cymes terminal and from the upper axils laxly corymbose trichotomous, peduncles 4 sided, the partial ones umbellately 3-7 flowered, pedicels half the length of the shortly turbinate slightly 4 lobed calyx, flowers small, petals free o cohering and falling off as lid. *Wight Icones tab.* 533.

Ceylon, common up to 3000 feet, called Panookaara. I have this or a closely allied species (with the leaves petioled) from the S. Tinnevelly mountains.

9. EUGENIA REVOLUTA, *Wight.*—A middling sized tree, branches obscurely 4 angled, leaves from lanceolate with a small blunt point to oval or broadly obovate very obtuse, very coriaceous, often revolute at the margins, very variable in size, penniveined, polished above, dull glaucous beneath, cymes terminal longish peduncled, flowers sessile congested at the ends of the branchlets, calyx 4-5 toothed petals free or cohering and falling off as a lid, fruit spherical reddish, the size of a small cherry. *Wight Icones tab.* 534.

Ceylon at an elevation of 3000 to 6000 feet.

10. EUGENIA ANDROSŒMOIDES, *Linn.*—A large handsome tree, glabrous, leaves coriaceous, penniveined ovato-lanceolate acuminate, sessile, cordate, stem clasping, 6-8 inches long by about 3 inches broad; cymes corymbose much shorter than the leaves terminal and axillary, flowers small, calyx slightly 4 toothed, petals cohering and falling off as a lid, fruit subspherical 1 inch in diameter.—Eug. cordifolia, *Wight Icones tab.* 544;—*Thw. En. Pl. Zey. p.* 116.

Ceylon, Ambagamwa and Ratnapoora, up to 3000 feet elevation, a most distinct and beautiful species.

11. EUGENIA MALABARICA, *Bedd.*—For description, &c. see Pl. cxcix.

12. EUGENIA ALTERNIFOLIA, *Wight.*—For description, &c. see Pl. cxcviii.

13. EUGENIA GRANDIS, *Wight.*—A large tree, glabrous, leaves coriaceous shining obovate abruptly and very shortly acuminate obtuse or retuse, narrowed at the base, 4-8 inches long by 3-3½ inches broad, veins numerous subparallel prominent on both sides, petioles ¾ 1 inch long, panicles terminal and from the upper axils shorter or about as long as the leaves, flowers large, (for the genus), calyx attenuated into a short pedicel the 2 together ½ an inch long, and the former 4 lines broad, segments short rounded,

petals distinct and falling off separately. *Wight. Ill.* ii. 17, *and Icon.* 614. Eug. firma, *Wall. cat.* 3603*A. not DC. Prod.* iii. *p.* 282. Syzygium firmum *Thw En. Pl. Zey. p.* 417, and S. montana, *Thw. l. c. p.* 116. (not *Wight.*) E. cymosa, *Roxb. Fl. Ind.* ii. 492, not *Lam.* Jambosa grandis and firma, *Blume Mus. Bot.*

Ceylon, Ambagamwa district at 4000 feet elevation, also in Bengal.

14. EUGENIA CARYOPHYLLÆA, *Gærtn.*—A large shrub or sometimes a middling sized tree, glabrous, leaves obovate or spathulate or more rarely ovato-lanceolate, obtuse or with a very short acumination, somewhat coriaceous, inconspicuously dotted, cymes terminal corymbose trichotomous lax, flowers small, calyx turbinate inconspicuously repand or 4 toothed, petals cohering and falling off as a lid, fruit globose size of a pea. *Wight Icones. tab.* 540.

Very common in S. Canara, Malabar, &c., particularly near the banks of rivers, generally in the form of a large shrub only; it is also common in Ceylon up to 3000 feet elevation, where it is called Dáng, the fruit is eaten.

15. EUGENIA GARDNERI, *Thw.*—A middling sized tree, leaves glabrous pale green, ovato-lanceolate rostrato-acuminate beneath delicately parallel veined, pellucidly punctate, 2½-4 inches long by 1-1½ broad, petiole slender 4-5 lines long, cymes shorter than the leaves terminal and axillary, flowers small, calyx obscurely 4 toothed, petals cohering and falling off as a lid. *Thw. En. Pl. Zey. p.* 117.

Anamallays and Tinnevelly mountains up to 4000 feet, and in Ceylon 2000-4000 feet. (This much resembles E. toddalioides, *Wight*, and should be compared with that plant.)

16. EUGENIA MICRANTHA, *Thw.*—A middling sized tree, leaves glabrous ovate or elliptic obtusely rostrate-acuminate, venose, obscurely punctulate, narrowed at the base, 2-4 inches long (of which the point is ½ to ¾ inch), ½-2 inches broad, petiole 2-5 lines long, cymes about equalling the leaves, flowers small, calyx acutely 4-toothed, berry spherical reddish as large as a pea. *Thw. En. Pl. Zey. p.* 117.

Ceylon, central provinces, elevation 3000-5000 feet.

17. EUGENIA RUBICUNDA, *WA.*—A small tree or large shrub, glabrous, leaves narrow oblong attenuated at both ends obtuse at the very point, coriaceous pellucid-dotted striated with numerous parallel transverse veins, 2½-3 inches long by about ½ inch broad, petioles 2-4 lines long, cymes corymbose terminal longer than the leaves, flowers minute, calyx repand 4-lobed shortly turbinate. *WA. Prod. p.* 330;—*Wight Icones tab.* 538.

Tinnevelly district very common up to 3000 feet elevation.

18. EUGENIA LISSOPHYLLA, *Thw.*—A middling sized tree, leaves ovato-lanceolate acuminate very smooth finely striated below with numerous parallel transverse veins, punctulate, 1½-3 inches long by 6-13 lines broad, petioles 2-3 lines long, cymes generally longer than the leaf, calyx-teeth short rounded. *Thw. En. Pl. Zey. p.* 117.

Ceylon, central provinces 3000-5000 feet, perhaps not distinct from E. rubicunda.

19. EUGENIA UMBROSA, *Thw.*—A middling sized tree, very ramous, leaves ovate shortly and obtusely acuminate or retuse narrowed at the base, very smooth on both sides, almost veinless, 1-2 inches long by 6-10 lines broad, petiole 1½-2 lines long, cymes longer than the leaf. *Thw. En. Pl. Zey. p.* 13.

Ceylon, open grassy places, central provinces 5000-6000 feet, similar to the last species in inflorescence but differing in the shape and venation of the leaves.

20. EUGENIA SPATHULATA, *Thw.*—A small tree, leaves spathulato-obovate or lanceolate obtuse, above shining below opaque, sparingly parallelo-venose, densely glanduloso-punctate, 1-1¾ inches long by 4-8 lines broad, petiole 1-1½ lines long, cymes about as long as or shorter than the leaves, flowers small shortly pedicellate, fruit spherical, reddish black, size of a pea. *Thw. En. Pl. Zey. p.* 118.

Ceylon, central provinces, 3000-5000 feet elevation.

21. EUGENIA SCLEROPHYLLA, *Thw.*—A middling sized tree, leaves glabrous very coriaceous obovate or rotundate sessile cordate, venose beneath, costa thickened at the base, ½ to 1 inch long by 4-10 lines broad, cymes about equalling the leaves, berry spherical blackish as large as a small cherry. *Thw. En. Pl. Zey. p.* 118.

Ceylon, central provinces 6000-7000 feet, nearly allied to Eugenia rotundifolia.

22. EUGENIA OLIGANTHA, *Thw.*—A small tree, leaves obovate retuse or shortly pointed narrowed at the base, punctate, obscurely venose, 4 lines to 1 inch long by 3-8 lines broad, petiole 1 line long, capitula few flowered, shortly pedunculate terminal, fruit spherical reddish black, size of a pea. *Thw. En. Pl. Zey. p.* 118.

Ceylon, Ambagamwa district, 3000-5000 feet elevation.

23. EUGENIA ROTUNDIFOLIA, *Arnt.*—A small tree or large shrub, leaves orbicular very obtuse or obscurely pointed subcordate at the base or a little narrowed, coriaceous, scarcely punctate, above glossy, veinless beneath, penniveined, 4-8 lines long, petiole ½ to 1½ lines long, cymes terminal sessile capituliform few flowered, calyx obovate shortly toothed, fruit spherical reddish-black, size of a small cherry. *Arnt.*;—*Wight. Ill. p.* 17.

Ceylon, Ambagamwa district, 3000-5000 feet elevation.

24. EUGENIA SALICIFOLIA, *Graham.*—A small tree or large shrub, leaves glabrous linear lanceolate tapering at both ends obtusely acuminate, transversely finely parallel veined, pellucid dotted, 4-5 inches long by ¾ inch broad, cymes numerous lax trichotomous from the scars of the fallen leaves (as in E. jambolana), flowers small white. *Graham Cat. of Bombay Plants ;—Dalz. Bombay Flora p.* 94 ;—*Wight Ill.* ii. *p.* 16, *and Icones tab.* 532.

Bombay ghats, banks of streams at the higher elevations ; called Panjambool; Jubbulpore bed of the Nerbuddah ; the wood is much used for rafters.

SECTION ACMENA.—*Characters the same as Syzygium, only the calyx tube is elongated and tapers at the base, and the flowers are more showy.*

25. EUGENIA ZEYLANICA, *Wight.*—For description, &c. see Pl. ccii.

26. EUGENIA LANCEOLATA, *Wight.*—A small tree, leaves glabrous elliptic oblong slightly tapering at both ends, thinly coriaceous inconspicuously dotted marked beneath with the transverse veins, 3-5 inches long by about 1½ broad, peduncles 4 angled terminal axillary or from the former year's axils, flowers numerous and arranged in umbels on the partial lateral pedicels, or few about 3 together at the apex and 2-3 at the sides of each peduncle, calyx glabrous (sometimes glaucous) elongate obovate repandly 4-5 toothed, petals falling off as a lid or occasionally the outer ones expanding. *Wight. Ill.* ii. *p.* 15, *& Icones tab.* 530. Eugenia (Acmena) Wightiana, *Wight. Ill. p.* 15, *& Icones tab.* 529.

A very showy tree when in full blossom. I have specimens from all parts of our Western ghats and Ceylon ; they differ much in the length of the calyx-tube and number of flowers.

SECTION JAMBOSA.—*Flowers in terminal or axillary short panicles or cymes or rarely on short axillary 1 flowered peduncles (E. Wightii), calyx tube turbinate usually elongate and tapering at the base or hemispherical (Strongylocalyx), more or less produced above the ovary, prominently lobed, the lobes usually persistent, glabrous trees.*

Strongylocalyx, Bl., belongs to this section, and only differs in having a rounded instead of a cylindric calyx-tube (unde nomen) and is not generally admitted even as a distinct section from Jambosa.

27. EUGENIA CYLINDRICA, *Wight.*—For description, &c. see Pl. cci.

28. EUGENIA WIGHTII, *Bedd.*—A middling sized very graceful tree, glabrous, leaves submembranaceous lanceolate attenuated at the base and ending in a longish blunt acumen, 4-5 inches long by about 1½ inch broad, punctate, veins inconspicuous above more prominent beneath with large single connecting loops at some distance from the margin, petioles 2-3 lines long, peduncles axillary or from the old axils solitary 1 flowered, ½ to 1¼ inches long, flowers very large 2 to 3 inches in full expansion generally crimson but white in one variety, calyx tube cylindrical very long and slender and generally attenuated into a pedicel, limb 4 cleft, lobes rounded.—Eugenia pauciflora, *Wight Icones tab.* 526—(not *DC. Prod.* iii. *p.* 269.)

A very elegant tree common in all our moist Western ghat forests from Canara downwards, it is very distinct from Eugenia cylindrica, the peduncles are always only 1 flowered, the calyx tube much more slender and the flowers much larger, the leaves much more membranaceous, and the veins only forming single loops, not double as in cylindrica.

29. EUGENIA MUNRONII, *Wight.*—A middling sized tree glabrous, leaves very coriaceous more or less cordate at the base, from linear-lanceolate to broad-lanceolate ending in a blunt acumen 6-9 inches long by ¾-3 broad, punctate, veins very prominent beneath and meeting within the margin and forming a thick coarse nerve waved or sometimes very regular and straight, petioles 1-2 lines long, cymes terminal, flowers white very large, calyx tube much attenuated at the base, lobes somewhat membranaceous. *Wight Icones tab.* 546.

A very beautiful tree common in our moist Western ghat forests from Canara down to Cape Comorin. Wight's figure is good, but the leaves are often very much narrower.

30. EUGENIA AQUEA, *Rumph.*—A middling sized tree, glabrous, leaves from oval to oblong or lanceolate, almost sessile more or less cordate at the base, very coriaceous, black-dotted, 1½-2¼ inches long by 1-1⅛ broad, veins a little prominent beneath (when dry) forming inconspicuous loops near the margin, petioles about 1 line long, peduncles terminal or from the upper axils 3-many flowered, flowers rather large white or red, calyx tube cylindric and slightly turbinate upwards about 1 inch long, lobes 4 subreniform, petals subrotundate small. *Roxb. Fl. Ind.* ii. 492 ;—*Wight Icones* 216 *and* 550 ?

Anamallay mountains, banks of rivers 6000 feet elevation, Ceylon central provinces up to 5000 feet very common, called Wal-jamboo. A very handsome tree ; both my Ceylon and Anamallay speciments have the leaves exactly oval and not more than 2¼ inches long, the Anamallay specimens have slightly smaller and more numerous flowers, and the calyx tube is very gradually broader upwards and not at all contracted near the apex as it is in those from Ceylon ; the Anamallay tree has the young ramuli acutely 4-angled, and they appear nearly quite terete in the Ceylon plant, and in the former the veins run exactly at right angles with the midrib, though in the Ceylon plant they are oblique ; the two however cannot be different species. Wight's figures 216 and 550 (the latter copied from Roxburgh) give no idea of our tree, the calyx tube is much shorter and broader, and the leaves very much larger.

31. EUGENIA HEMISPHÆRICA, *Wight.*—For description, &c. see Pl. cciii.

This is the Strongylocalyx hemisphærica of Blume ; it differs very much in the size of its flowers, and I believe Eugenia lanceolaria, *Roxb.*, to be the same plant, at least unless I have confounded the 2 species. Some of my specimens quite agree with Roxburgh's figure of lanceolaria.

To this section Jambosa, belong Eugenia caryophyllata (the Clove), Eugenia jambos (the rose-apple), Eugenia Malaccensis and Eugenia alba, handsome trees of Asiatic origin introduced into gardens in S. India, but not indigenous in the presidency.

SECTION EU-EUGENIA.—*Peduncles generally solitary or several together 1-flowered rarely forming short few flowered racemes; calyx tube not at all or scarcely produced above the ovary, lobes generally prominent and persistent, petals free and spreading, flowers (much like the myrtle) more conspicuous than in Syzygium, less so than in Jambosa, young parts and inflorescence generally more or less floccose or silky.*

32. EUGENIA FLOCCOSA, *Bedd.*—For description, &c. see Pl. cc.

33. EUGENIA BRACTEATA, *Roxb.*—A shrub or rarely a small tree, young shoots, petioles, peduncles and calyx clothed with a rusty pubescence, leaves ovate-oblong tapering or cuneate at the base obtuse or with a short blunt acumination, at first slightly downy at length quite glabrous and shining above, pellucid-dotted, peduncles usually axillary or sometimes terminal short 1-flowered longer than the petioles 1-4 together with 2 small bracteoles under the calyx, calyx-segments 4 unequal linear-oblong obtuse ciliate, petals 4, style slender, fruit globose 1-2 seeded. *Roxb. Fl. Ind.* ii. *p.* 290;—*WA. Prod. p.* 331. E. Roxburghii, *DC.* iii. 271.

A shrub or small tree very common in the plains of S. India and Ceylon, particularly so on the seacoast, where it is only a shrub; in subalpine jungles it grows to be a small tree, and I have specimens from the Anamallays 5000 feet elevation.

34. EUGENIA WILLDENOVII, *DC.*—A small tree or large shrub, the young shoots, young leaves, and inflorescence pubescent, leaves lanceolate at length glabrous or subglabrous obtusely pointed not dotted coriaceous, veins not prominent joined into a waved continuous one near the margin, 1½ to 2 inches long by ½-¾ inch broad, petioles 2-4 lines long, peduncles filiform 1 flowered ¾ to 1 inch long solitary or in pairs in the axils or on the leafless branchlets, with 2 short subulate bracteoles under the calyx. *Wight Icones tab.* 545. (Not characteristic, and the peduncles are represented as 2 flowered, which they never are).—E. Zeylanica, *WA. Prod. p.* 331.

Very common in the plains of S. India and Ceylon, called Tambaleya in the latter island; wood strong and in use but of small size.

35. EUGENIA ROTTLERIANA, *WA.*—A small tree or shrub, much branched, young shoots, petioles and inflorescence covered with rust colored tomentum, leaves from lanceolate to linear lanceolate tapering at both ends obtuse at the point at length glabrous, pellucid-dotted 1-2 inches long by ¼ to ½ inch broad, petioles 1-3 lines long, peduncles axillary solitary or several together or on small lateral shoots, filiform 1 flowered, ¼-¾ inch long, bracteoles 2 under the calyx, calyx lobes 4 triangular ovate obtuse, petals much longer than the calyx. *WA. Prod p.* 331;—*Wight Icones tab.* 100 (*bad.*)

Tinnevelly ghats up to 4000 feet, a very pretty little tree. There are two distinct forms, one with the leaves 1-1½ inches long and ½ inch broad, the other with them about 2 inches long and only ¼ inch wide; the former variety comes very near to Willdenovii.

36. EUGENIA MICROPHYLLA, *Bedd.*—A small tree, much branched and very dense, glabrous in all its parts, young branches angled and winged, leaves opposite occasionally alternate or subalternate thickly coriaceous linear obtuse, 4-6 lines long by 2-3 lines broad, when young bright red and quite glabrous, veins quite inconspicuous prominently black dotted, petioles 1 line long, peduncles axillary solitary shorter than the leaves 1 flowered, fruit the size of a large grain of pepper.

A most beautiful little tree, Muṭi-kuli-vayal, a valley on the Asamboo hills (Travancore), 4500 feet elevation, banks of a river abundant in fruit in August. I unfortunately could not procure it in flower.

37. EUGENIA MOONIANA, *Wight.*—A shrub or small tree, young shoots puberulous, leaves pellucid dotted, short petioled ovate tapering at the base acuminate, acumen either short and blunt or prolonged and tapering to a fine point, peduncles axillary solitary or in pairs 1 flowered, flowers small, calyx tube ventricose oblong, limb 4 cleft, segments reflexed pointed, fruit globose size of a cherry. *Wight. Icones tab.* 551.

Western ghats of the Madras Presidency from Canara downwards and in Ceylon up to 4000 feet. E. gracilis, *Bedd. Linn. Trans. vol.* xxv., is I believe only a form of this, although it has oblong instead of globose fruit. I have another species nearly allied to this, which I think will prove new, but my specimens are not very perfect, it has the peduncles several flowered.

38. EUGENIA WYNADENSIS, *Bedd.*—A small tree or shrub, young leaves ramuli and inflorescence densely fulvo-tomentose, leaves oblong lanceolate with a long blunt acumination, when old quite glabrous on both sides, 3-3½ inches long by 1-1¼ broad, petioles 3-4 lines long, peduncles supra-axillary 6 lines long, calycine lobes 4 lanceolate acuminate a little longer than the corol, bracts 2 linear much longer than the sepals, stamens inserted round the edge of the disk, ovary 2-celled, ovules pendulous from the apex, about 4 in each cell. *Bedd. Mad. Lit. Soc. Journ.*

Common about Devallicottah in the Wynad, elevation 2000-3000 feet.

39. EUGENIA ARGENTEA, *Bedd.*—A small tree or shrub. Stems, petioles, peduncles and under surface of the leaves deusely silvery-pubescent, leaves ovato-elliptic to lanceolate rounded at the base, terminating in a longish fine acumination at the apex not dotted, 4-5½ inches long by 1¼-1½ broad, veins rather prominent beneath running into a regular looped vein near the margin, peduncles 1 inch long filiform from the old axils or axillary furnished with a long filiform bract at the base, flowers 4-5 lines across in expansion furnished at the base with 2 long filiform bracteoles double the length of the calyx lobes.

In the Wynad 3000 feet elevation, a rare tree.

40. EUGENIA CALCADENSIS, *Bedd.*—A small tree, young shoots, young leaves and inflorescence covered with dense rusty pubescence, leaves sometimes subalternate coriaceous not dotted, elliptic to subobovate obtuse at the apex, very rugose on the upper

side but glabrous in age except the channelled costa, venation quite inconspicuous above, slightly prominent beneath the primary veins joined into a marginal one, 2½-3 inches long by 1-1¼ broad, petioles 3-4 lines long, peduncles axillary solitary about as long or a little longer than the petiole, 2-flowered at the apex rarely only 1 flowered, pedicels, 1-1¼ inches long furnished with a subulate bract at the base of each and 2 at the apex below the calyx, flowers showy white, 1-1¼ inches in diameter, calyx lobes rounded about 3 lines long, petals oblong ciliate 6-8 lines long, disk suborbicular woolly covering the top of the ovary, stamens inserted all over it.

A very beautiful little tree only observed on the Calcad hills, South Tinnevelly, elevation 2000 feet.

41. EUGENIA TERPNOPHYLLA, *Thw.*—A middling sized tree, branchlets terete, young branches, young leaves and inflorescence ferrugineo-pilose, leaves membranaceous lanceolate or oblongo-lanceolate with a long acumination more or less attenuated at the base, 2½-5 inches long by ½-2 inches broad, primary veins 5-8 prominent beneath, looped, marginal veins double, the inner one most prominent, petiole ¼ ½ inch long, peduncles axillary and terminal short few flowered, pedicels equalling the petiole, petals white twice as long as the rounded lobes of the calyx, fruit spherical puberulous as large as a small cherry generally 1 seeded. *Thw. En. Pl. Zey. p.* 114.

Ceylon, Ambagamwa and Ratnapoora and Reigan Corle at no great elevation.

42. EUGENIA RUFO-FULVA, *Thw.*—A tree 30-40 feet high, young parts short rufo-or fulvo-pilose, leaves lanceolate with a long sharp acumination glabrous and shining above (except whilst young) channelled on the costa beneath shortly clothed with adpressed rufous or fulvous tomentum, at length subglabrous, primary veins joined near the margin in a waved continuous one, 4-5 inches long 1-1½ inches broad, petiole ½ an inch long, peduncles axillary short 1-3 flowered, pedicels longer than the petiole, calyx with small subulate bracteoles. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Gattehatte near Avishanelle.

43. EUGENIA XANTHOCARPA, *Thw.*—A low tree, young parts and inflorescence ferrugineo-pilose, leaves elliptic lanceolate obtusely acuminate glabrous acute at the base channelled above at the costa, the primary veins numerous and joined near the margin into a continuous vein ; 2½-4 inches long 1-1½ inches broad, petiole 3 lines long, peduncles axillary several flowered, pedicels about equal to the petioles, fruit 1-4 seeded subspherical, ferrugineo-pilose and minutely glanduloso verrucose, 3-6 lines in diameter yellowish. *Thw. En. Pl. Zey. p.* 416.

Ceylon, between Galle and Colombo near the sea coast.

44. EUGENIA AMÆNA, *Thw.*—A small tree, ramuli terete, leaves sessile cordate or ovato-lanceolate acuminate glabrous reticulate beneath, 2-6 inches long by 1¼-2¼ inches broad, flowers generally terminal subfasciculate, pedicels 7-10 lines long rarely shorter, petals 4 white oblong about 3 lines long longer than the rounded lobes of the calyx. *Thw. En. Pl. Zey. p.* 114.

Ceylon, Kokool Corle, and Dolosbage district up to an elevation of 1500 feet.

45. EUGENIA MABEOIDES, *Wight.*—A rigid shrub, quite glabrous in all its parts, very ramous, leaves short petioled obovate-spathulate glabrous rigid shining above densely glanduloso-punctate, ½-2 inches long by ¼-1¼ broad, pedicels very short fascicled on short subaxillary tubercles, calyx-tube ventricose, limb 4-parted, fruit spherical as large as a small cherry. *Wight Ill.* ii. *p.* 13 ;—*Thw. En. Pl. Zey. p.* 114.

Ceylon, central provinces, at 4000-7000 feet elevation.

46. EUGENIA FLOCCIFERA, *Thw.*—A small tree, young parts and inflorescence densely fulvo-tomentose, branches terete, leaves oblongo-lanceolate with a very long gradual acumination, at length glabrous, 4-8 inches long by 1-2 inches broad, primary veins rather prominent beneath joined in a marginal loop-vein, petiole 3-4 lines long, pedicels axillary short fascicled, calyx-lobes 4 lanceolate much longer than the tube, equalling the petals, petals white 4 lines long. *Thw. En. Pl. Zey. p.* 115.

Ceylon, Reigam Corle at no great elevation.

47. EUGENIA FULVA, *Thw.*—A small tree, branches terete, young parts and inflorescence fulvo-tomentose, leaves elliptic or oblong abruptly and shortly acuminate rounded at the base, venose beneath, 4-6 inches long by 2¼-3 inches broad, petiole 4 lines long, flowers axillary and cauline small sessile crowded. *Thw. En. Pl. Zey. p.* 115.

Ceylon, Pasdoon Corle, at no great elevation.

48. EUGENIA RIVULORUM, *Thw.*—A small tree, branchlets terete, leaves lanceolate acuminate narrowed at the base, below, minutely fulvo-pilose, at length glabrous, 10-14 inches long 3-4½ inches broad, petiole about ½ inch long, flowers large sessile axillary and cauline, calyx pilose on the outside, lobes 4 rounded as long as the tube, petals oblong pale purple 5 lines long. *Thw. En. Pl. Zey. p.* 115.

Ceylon, banks of streams, Singhe Rajah forest between Galle and Ratnapoora, at no great elevation.

49. EUGENIA INSIGNIS, *Thw.*—A low ramous tree, young parts villous with fugaceous white down, leaves glabrous oblong acuminate, slightly acute at the base smooth above, channelled at the costa, paler beneath, (primary veins about 12 on each side prominent looped at the margin in a continuous vein, areoles smooth almost veinless,) 6-8 inches long by 2-3½ inches broad, petioles 6-8 lines long, flowers axillary and on the branches few sessile small, calyx albo-villous on the outside, segments oblong 2 lines long, petals a little longer ciliate, fruit spherical albo-villous or floccose. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Galpara in the Reigam Corle.

50. EUGENIA DECORA, *Thw.*—A small tree, branches terete, leaves oblong acuminate rounded at the base glabrous shining above, beneath paler and minutely reticulate, 4-5 inches long by about 2 inches wide, petiole 4 lines long, flowers white sessile crowded axillary and cauline, fruit transversely oblong reddish black 6 lines long by 8 lines wide, 2-seeded. *Thw. En. Pl. Zey. p.* 115.

Ceylon, near Galle at no great elevation.

51. EUGENIA CONCINNA, *Thw.*—A tree, branchlets terete, young parts pilose, leaves firm very slightly pilose at length glabrous ovate rather abruptly acuminate obtuse a little acute at the base, primary veins 12-16 on each side with a marginal connecting vein, areoles obscurely venoso-reticulate, 3-5 inches long by 1½-2½ inches broad, petiole 2-3 lines long, pedicels axillary fasciculate twice as long as the petiole, flowers small, fruit spherical glabrous shining red 6 lines in diameter. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Ambagamwa district.

52. EUGENIA CUNEATA, *Heyne.*—A small tree or shrub, leaves short petioled obovato-spathulate, glabrous on both sides, peduncles axillary solitary or congested sometimes from the abortion of the leaves, corymbose on the ends of the branches 1-flowered, tube of the calyx globose clothed with soft white tomentum, limb 4-lobed persistent, fruit the size of a sloe. *Heyne in Herb. Wall.* 8625. Jossinia Indica, *Wight Icones tab.* 523 ;—*Bl. Mus. Bot.* 1. *p.* 122.

Sevagherry hills (Tinnevelly district).

53. EUGENIA CODYENSIS, *Munro.*—Shrubby glabrous, leaves short petioled from ovate oblong to obovate with a short blunt acumen tapering towards the base, pellucid-dotted, flowers subsessile aggregated forming terminal capituli on the points of short abortive branches, or they are axillary solitary or a few together, calyx tube small clothed with silky tomentum somewhat globose, limb persistent, lobes ciliate, petals twice the length of the calyx, lobes ciliate, style and stigma simple, fruit globose 1-2 seeded. *Wight Ill.* ii. *p.* 13.

Coorg, near Mercara, flowers sweet scented. I have never found these last 2 species.

I have in my Herbarium several undescribed species of the Syzygium section, but my specimens are not perfect enough for description ; further search will undoubtedly add some new species from the higher ranges of the Palghat hills, Anamallays, Tinnevelly, Travancore, &c. From Ceylon I have an undescribed species from Dr. Thwaites, labelled Eugenia hypoleuca.

I have figured 7 species, exhibiting the most marked forms of this large genus ; space will not allow of more figures as it is proposed to complete the work in 25 numbers.

BARRINGTONIA. FORST.

For Gen. Char. see letter-press to Pl. cciv.

1. BARRINGTONIA ACUTANGULA, *Gærtn.*—For description, &c. see Pl. cciv.

2. BARRINGTONIA RACEMOSA, *Roxb.*—A good sized tree, leaves cuneate-oblong acuminated serrulate or crenulated, 3-12 inches long by 1-4 broad, flowers large pale pink forming a long pendulous raceme, pedicels scarcely so long as the flower 1-bracteated at the base, calyx at length 2-3 cleft, ovary 2-celled, ovules attached to the middle of the dissepiments, fruit ovate size of an egg bluntly 4-angled. *Roxb. Fl. Ind.* ii. 634 ;—*WA. Prod. p.* 333 ;—*Rheede. Mal.* 4. *t.* 6 ;—*Wight Icones t.* 152.

Malabar, Travancore about the backwaters, and Ceylon, in the latter place it is called Deya-midella, it is a very beautiful tree when in blossom, the bark and root are used medicinally by the natives, the timer is lighter in color than that of B. acutangula, closer grained and of less specific gravity and nearly as strong, it works well and gives a good even surface, unseasoned it weighs 60-65 lbs. the cubic foot, and seasoned 53 lbs., and its specific gravity is ·848, it is used for house building, cart-framing, &c.

3. BARRINGTONIA SPECIOSA, *Linn.*—A large handsome tree, leaves sessile obovate entire attaining more than 1 foot in length, flowers very large in short terminal racemes, the rachis thick, the pedicels 1-2 inches long, calyx deeply divided into 2-3-oval oblong concave almost leaf-like segments above 1 line long, petals from half as long again to twice as long as the calyx-segments, stamens very numerous red 2-4 inches long, ovary imperfectly 4-celled with about 6 ovules in each cell, fruit large pyramidal 4 angled crowned by the persistent calyx-lobes. *Wight. Icones. tab.* 547 ;—*Benth. Fl. Aust.* iii. *p.* 288.

Ceylon, common on the sea-shore between Galle and Matura, has been introduced into gardens in S. India, but is not I believe found in a wild state ; it is indigenous in the Archipelago, and the Pacific Islands and Australia (Queensland).

CAREYA. ROXB.

For Gen. Char. see letter-press to Pl. ccv.

1. CAREYA ARBOREA, *Roxb.*—For description, &c. see Pl. ccv.

I
Bruguiera Rheedii
II
Blepharistemma corymbosa
III
Rhodomyrtus tomentosa
IV
Woodfordia tomentosa
V
Pemphis acidula
VI
Lawsonia alba

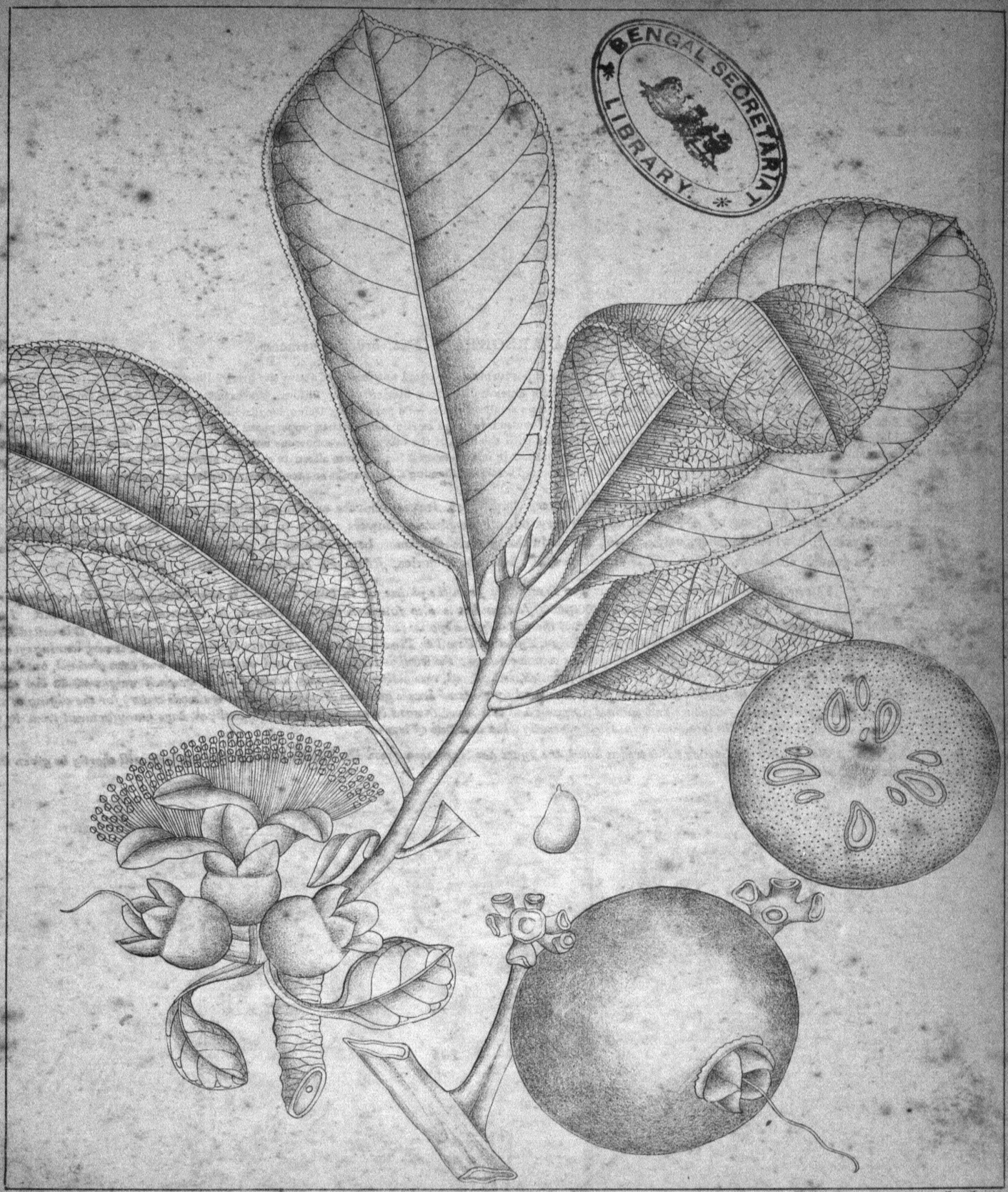
CAREYA ARBOREA. (Nat. order Myrtaceæ.)

CAREYA. *Roxb.*—GEN. CHAR. Calyx-tube thick turbinate or ovoid not produced above the ovary, limb deeply 4-lobed, petals 4 spreading; stamens very numerous inserted in many series on the thick concave disk, free, filaments long filiform, the exterior longer and the interior shorter ones or both without anthers, the middle ones antheriferous, anthers small versatile, cells parallel dehiscing longitudinally, ovary inferior 4-5 celled thick and fleshy, style elongate, stigma subcapitate obscurely 4-lobed, ovules numerous in the cells minute, superposed in 2-6 series on the central placenta, berry globose furnished with a rind (formed by the calyx) crowned with the limb of the calyx, seeds numerous nestling in fleshy pulp, and irregularly scattered, testa thick, embryo indivisible, cotyledons none. Large trees or in one instance a herb, leaves alternate crowded towards the apex of the branches penni-veined serrated not dotted, flowers large yellowish, white or red sessile or forming a short spike or raceme or pedicellate and somewhat corymbose.

CAREYA ARBOREA. (Roxb.) A very large tree, leaves obovate or oblong slightly serrulate firm and glossy obtuse-pointed 8-12 inches long by 4-7 broad, stipules very minute deciduous, flowers sessile in terminal short few flowered spikes, large, fetid, yellowish white in color, calyx, corol, &c. as in the generic character, berry globose or broadly ovate and with the seed, &c. as in the generic character. *Roxb. Fl. Indica* ii. *p.* 638. ? Careya sphærica, *Roxb. Fl. Indica* ii. *p.* 636.

This large tree is common throughout the Presidency from the plains up to 5000 *feet, and is very abundant over the grassy parts of Wynad, Mysore, Coorg, &c., at an elevation of* 3000-4000 *feet, and it is also found in Ceylon, Birmah, N. Australia and Queensland. I much doubt if the C. sphærica of Roxb. is distinct; at least there is only one species (besides the little C. herbacea) in this Presidency ; it is called Kumbi in Canarese, and Budd-darmee and Dud-ippi in Teligu, Aymà in Tamil in Tinnevelly, and Cahaata in Ceylon. The bark is very astringent and is used medicinally and for tanning, and it furnishes a coarse cordage; the wood is tough, strong, and durable, close and even grained, but inferior to teak in its direct cohesive strength, admits of a fine polish, red colored, resembling mahogany, a cubic foot unseasoned weighs* 60-63 *lbs. and* 50 *lbs. when seasoned, and its specific gravity is* ·800. *It is used for posts of houses and cart framing, and (as it stands water) for the edging of wells, and it is well adapted for furniture and cabinet purposes and is a favorite wood in some parts for charcoal ; cordage manufactured from its bark is used as a slow match. The tree flowers in April generally when destitute of leaves.*

Not having specimens of this tree at hand, the figure has been taken from Dr. Wight's Illustration ; analysis will shortly be given in the analytical plates.



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Gomido del. Dampfey Lith.

Careya arborea (Roxb.)

MEMECYLON UMBELLATUM. (Nat. order Melastomaceæ.)

MEMECYLON. *Linn.*—GEN. CHAR. Calyx-tube hemispherical or campanulate, the limb entire or obtusely 4-lobed, rarely 5-lobed, plane inside or radiately 8-winged. Petals 4 or rarely 5, ovate or orbicular. Stamens twice as many as petals, all equal and similar; anthers short, with a thick connective, forming a conical spur at the base, the cells opening in longitudinal slits. Ovary entirely adnate to the calyx-tube, 1-celled, with 6 to 12 ovules, verticillate round a short central placenta; style filiform, with a small stigma. Fruit a berry, crowned by the calyx-teeth or border, or by a circular scar only. Seeds solitary or rarely 2 or 3, testa somewhat crustaceous; cotyledons very much convolute or variously folded, usually enclosing the radicle. Trees or shrubs glabrous. Leaves coriaceous, with 1 prominent midrib, and pinnate veins often scarcely perceptible or rarely more or less 3-nerved Flowers usually small, in axillary clusters or cymes, blue or white.

MEMECYLON UMBELLATUM. (Burm.) A middling sized or small tree or large shrub, branches terete, leaves coriaceous deep green and shining, sessile to shortly petioled, very variable in shape, from ovate or cordato-ovate to oblong or elliptic, retuse or obtuse or slightly acute at the apex, penniveined with the veins generally very obscure, very variable in size, up to 6 inches long by 2 inches broad, peduncles axillary or from the old axils below the leaves incrassated at the apex and forming a kind of receptacle, or sometimes wanting with the receptacle sessile, pedicels generally slender and 3-4 lines in length very numerous and each springing from a small sessile scale-like bracteole, flowers bright blue forming dense round balls on the naked stems below the leaves, calyx lined with a disk but without any radiating wing, stamens elongate, style as long as or much longer than the stamens, berry nearly dry or only slightly succulent, greenish, smooth nearly globular 3-4 lines in diameter crowned with the persistent calyx-limb, seed solitary globular, cotyledons fleshy and very much contortuplicate. *Burm. Fl Ind.* 87. M. ramiflorum, *Lam. Dict.* iv. 88;—*WA. Prod. p.* 319. M. tinctorium, *Wight Illust tab* 93. M. sessile, *Benth.*;—*WA. Prod. p.* 320. M. amplexicaule, *WA. Prod. p.* 320 *(but probably not Roxb.)* M. cordatum, *Lam.*

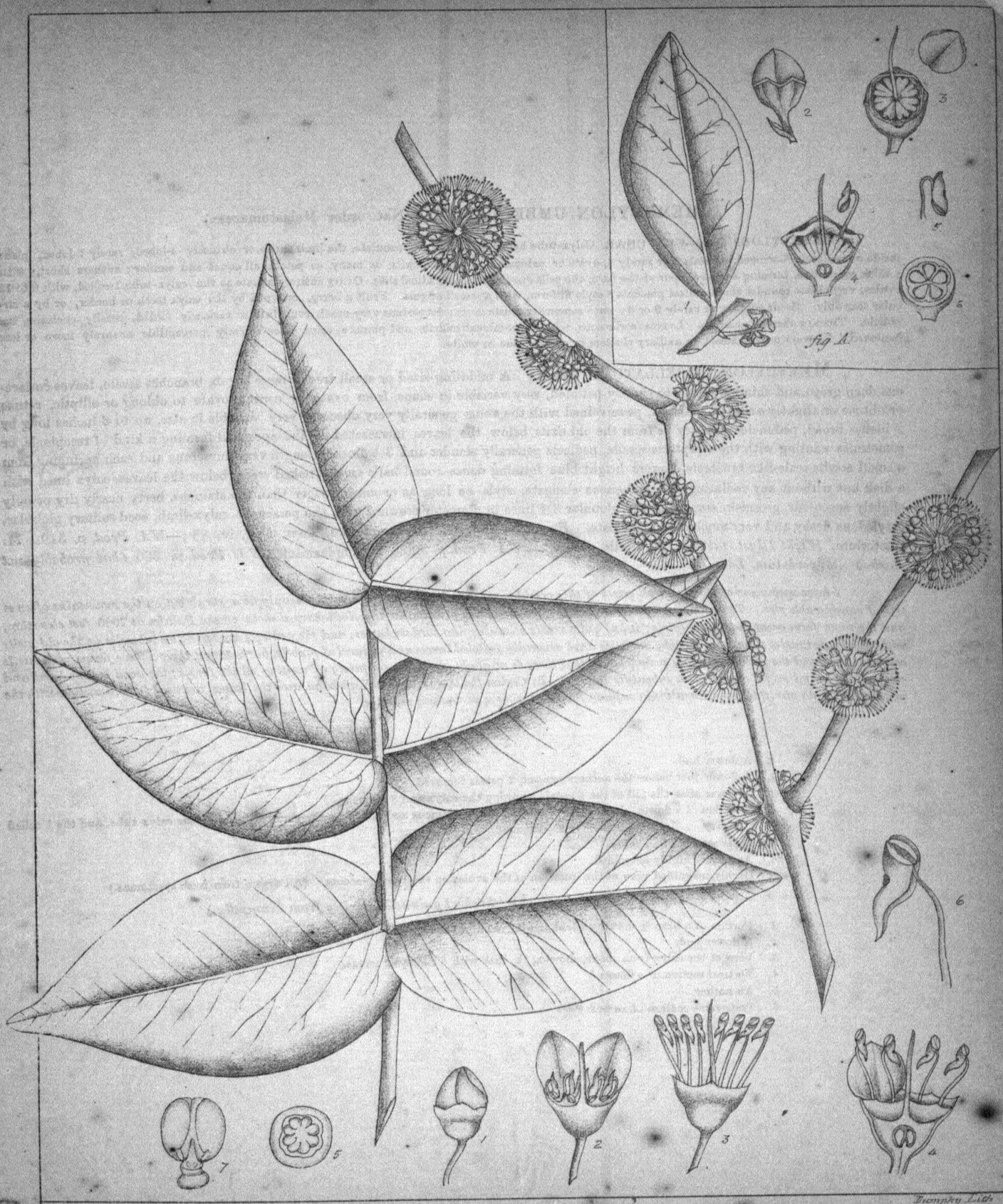
I have specimens of this from all parts of this presidency and from Ceylon, sometimes only as a shrub but on the mountains often a tree of considerable size. The specimen figured is from a good sized tree growing in the Kodinkarnal shola on the Pulnies at 7000 feet elevation, and the same form occurs on the Nilgiris; it has quite sessile stem clasping cordate leaves, and the pedicels are sessile on tubercles in the old axils without any peduncles; the more shrubby varieties have generally petioled leaves and peduncled umbels, but amongst these I have forms with sessile cordate leaves and the pedicels without peduncles, so that there is no doubt about the propriety of uniting all the forms; the wood is very hard and close grained, and might answer as a substitute for box. In Ceylon the tree is called Korà-kàhà, and the leaves are used in conjunction with the wood of Morinda citrifolia and Cæsalpinia sappan for producing a permanent red dye.

Analysis.

1. A flower bud.
2. A flower just before the anthers expand, 2 petals removed.
3. A flower after the fall of the 4 petals, showing the calyx and 8 stamens.
4. A section of a flower, showing the insertion of the stamens and petals on the plane disk lining the calyx tube, and the 1 celled ovary
5. Cross section of an ovary.
6. An anther highly magnified.
7. Highly magnified view of the insertion of the ovules on the basal placenta. (All drawn from fresh specimens.)

FIG. *A*. MEMECYLON CAPITELLATUM (*the short peduncled variety from Tinnevelly.*)

1. Portion of a branch showing a leaf and its venation, and a peduncle with flower buds.
2. A flower bud.
3. View of the calyx from above, showing the disk with 8 radiating wings.
4. Vertical section of a flower
5. An anther.
6. Transverse section of an ovary.



Memecylon umbellatum (Burm.)

AXINANDRA ZEYLANICA. (Nat. order Lythrarieæ.)

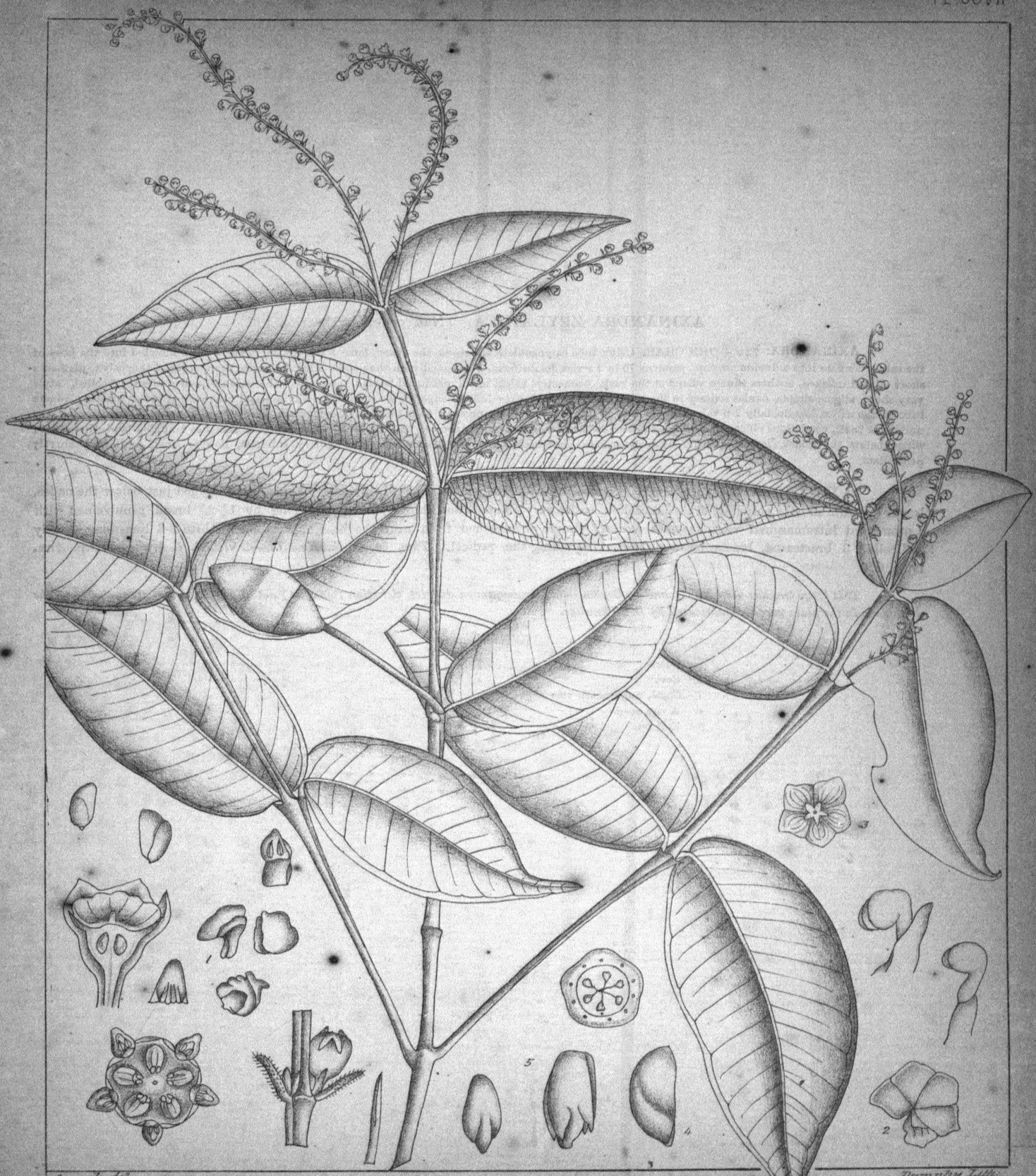
AXINANDRA. *Thw.*—GEN CHAR. Calyx-tube campanulate adnate to the ovary, lobes 5 triangular, petals 5 small inserted into the jaws of the calyx, connate into a deciduous cup, stamens 10 in 2 series dolabriform, 5 inserted with the petals, 5 affixed under the margin of the calyx, filaments short dilated inflexed, anthers adnate affixed at the back, connective thick, much produced behind, quadrate, cells minute, ovary inferior 6-celled, style very short, stigma simple, ovules solitary in the cells erect anatropal, capsule semi-superior woody oblongo-cylindrical surrounded below with the adnate tube of the calyx, loculicidally 2-6 valved at the top, seeds erect oblong compressed, testa membranaceous, the superior margin produced into a wing, the umbilicus basal, cotyledons oblong auriculato-saggitate at the base, radicle short terete. A large tree, very glabrous, branches 4-angled and dilated into wings below the nodes, leaves opposite ovato-lanceolate, acuminate entire coriaceous, racemes axillary suberect, flowers small white very shortly pedicellate.

AXINANDRA ZEYLANICA. (Thw.) A lofty tree, much branched, branches 4 angled, and winged just below the nodes, leaves opposite shortly petiolate, ovato-lanceolate, entire very glabrous and shining, 3-5 inches long by 1½-2½ broad, penniveined with a prominent intramarginal vein, racemes axillary simple or branched from near the base, flowers small white 2-3 lines long shortly pedicelled, 3 bracteated, bracts linear pubescent equalling the pedicel. *Thw. in Hook. Kew Journ.* vi. 66. *t.* 1. *c.* ;—*Walp. Ann.* iv. *p.* 690.

This large tree has only been found in Ceylon in the Ambagamwa district, elevation 1500 *feet ; nothing is known of its timber, &c. The dissections in the plate were communicated by Dr. Thwaites.*

Analysis.

1. Petals.
2. Corol.
3. Corol, underneath view.
4. A ripe seed.
5. Embryo.



Govindo del. Dunnyray Lith.

Aximandra Zeylanica (Thw.)

CASEARIA VARIANS. (Nat. order Samydaceæ.)

CASEARIA. *Jacq.*—GEN. CHAR. Flower-tube short; sepals 4-6, imbricate. Petals wanting. Staminal tube short, emerging from near the base of the flower-tube, divided at its upper margin into 6-15 fertile stamens and as many barren staminodes. Ovary free ovoid 1 celled with 3 or rarely 4 parietal placentas, style simple short; stigmas capitate; ovules numerous, capsule 3-4 valved, valves bearing the seeds in the middle. Seeds oblong, with a fleshy aril; albumen fleshy; embryo straight; cotyledons flat; radicle terete. Trees or shrubs. Leaves distichous, alternate, simple, coriaceous, often marked with linear or circular translucent spots. Stipules minute. Flowers tufted, small.—Valentinia, *Swartz.* Hexanthera, *Endl. Gen.* 917. Ironcana, *Aubl.* Vareca, *Gært.* Guidonia, *Griseb.* Pitumba, *Aubl.* Anavinga, *Lam.* Melistaurum, *Forst.* Lindleya, *H. B. et K. and Kunth.* Antigona, *Vell.* Crateria, *Pers.* Chætocrater, *Ruiz et Pav.* Piparea, *Aubl.* Zuelania, *A. Rich.* Thiodia, *Griseb.*

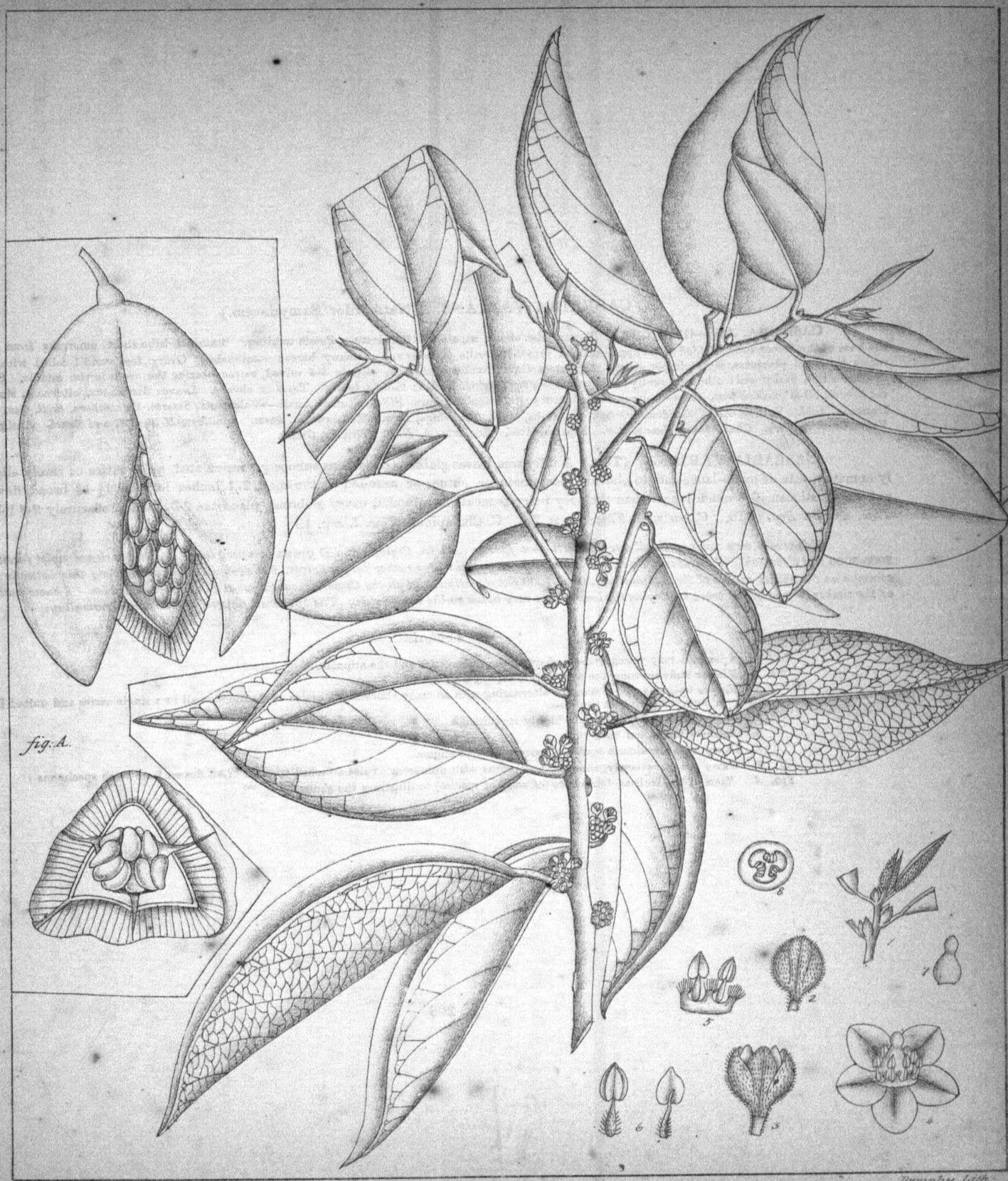
CASEARIA VARIANS. (Thw.) A lofty tree, leaves glabrous coriaceous subopaque reticulated, quite entire or rarely slightly crenate, ovate or ovato-lanceolate to obovate, acuminate or obtuse or rounded at the apex, 2-4 inches long by 1¼-1¾ broad, flowers pubescent, stamens 6-8 much longer than the very hairy truncate staminodia, ovary glabrous, placentas 2-3, stigma obscurely 2-3 lobed. *Thw. En. Pl. Zey. p.* 19. C. coriacea, *Thw. l. c. p.* 20. C. Championi, *Thw. l. c. p.* 19.

This tree is very common in all our Western ghat forests and in Ceylon, and it grows to a very large size in the dense moist forests at 2000-3000 *feet elevation. C. coriacea, Thw., is a form with very coriaceous rather larger leaves, but does not otherwise differ; this latter is very common on the higher ranges of the Anamallays,* 6000-7000 *feet elevation, and on the Ceylon mountains at the higher altitudes. I know nothing of the timber or uses of the tree; in drying the leaves turn very black on the upper side. The specimen figured is from the Anamallays.*

Analysis.

1. Apex of a very young branch, shewing the pubescence and the stipules.
2 & 3. Flower buds shewing the 5 imbricate sepals, no petals.
4. Flower open shewing 8 stamens alternating with as many short ciliate scales or staminodes all in a single series and united into a perigynous ring at the base
5. A portion of the stamen-tube highly magnified.
6. Anthers, front and back view.
7. Ovary with the almost sessile obscurely 3-lobed stigma.
8. Ovary cut transversely, shewing 3 placentas with numerous ovules attached to each. (All drawn from fresh specimens.)

FIG. *A.* View of the fruit at dehiscence (of another species) to illustrate the genus.



Govindo. del. Dampfey Lith.

Casearia varians. (Roxb.)

OSMELIA GARDNERI. (Nat. order Samydaceæ.)

OSMELIA. *Thw.*—GEN. CHAR. Calyx-tube very short, lobes 4-5 imbricate, petals none, stamens 8-10, 5 alternate with as many deeply 2-lobed densely villous staminodes, 5 inserted into the sinuses of the staminodes, filaments elongate subequal, styles 3 short incurved, stig mas capitellate, ovules few, placentas 3 parietal, capsule subglobose subcoriaceous 3-valved few seeded, seed subglobose, aril fleshy red, testa membranceous, cotyledons orbicular foliaceous, radicle short. Trees, leaves alternate, petiolate, ovato or oblongo-lanceolate, not dotted, stipules minute deciduous, flowers small furnished with a small involucel, in terminal racemose panicles.—Stachyerater, *Turcz in Bull. Mosc.* 1858. 464.

OSMELIA GARDNERI. (Thw.) A middling sized tree with a smooth bark, branches terete, young ones pilose, leaves ovato-lanceolate acuminate glabrous penniveined, 2½-4 inches long by 1-1½ inches broad, petiole sulcate above 2-3 lines long, stipules minute deciduous, racemes terminal paniculate (from the abortion of the leaves) many flowered pubescent, flowers small white more or less tinted with red, very shortly pedicellate, involucel small cup shaped; calyx lobes rounded externally pilose, ovary oblong densely pilose, placentas 2-3 ovuled, capsule 1-4 seeded. *Thw. En. Pl. Zey. p.* 20. Casearia paniculata, *Gardn. MSS.*

This tree has only been observed in Ceylon in the central provinces at about 3000 *feet elevation; it is not common; nothing is known of its timber or uses. Two other species of the genus inhabit the Philippines. The dissections in the plate were communicated by Dr. Thwaites.*

Gourlie, del. Dempsey, Lith.

Osmelia Gardneri (Hew.)

HOMALIUM CEYLANICUM. (Nat. ord. Samydaceæ.)

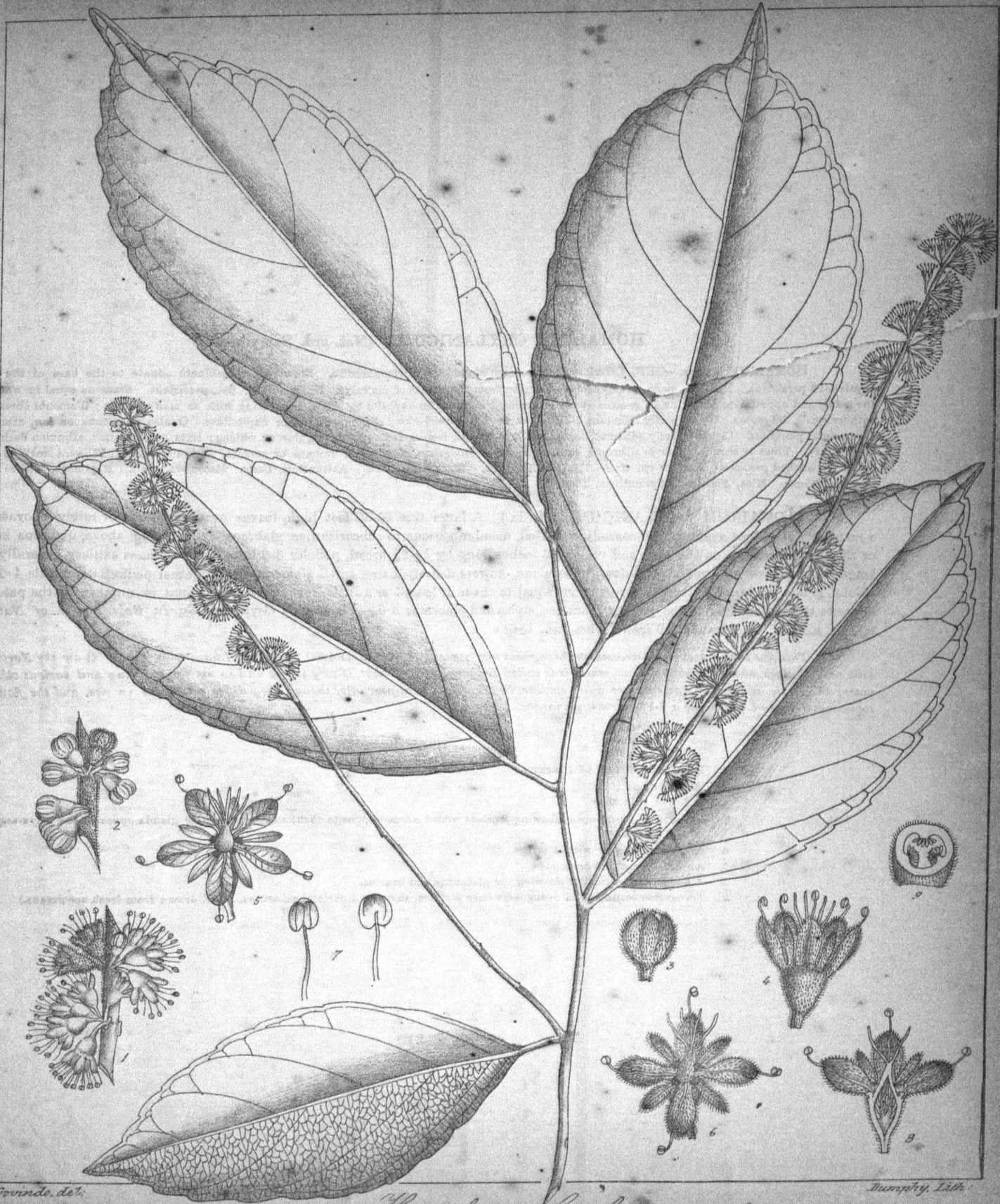
HOMALIUM. *Jacq.*—GEN. CHAR. Flowers dichlamydeous, hermaphrodite. Flower-tube turbinate adnate to the base of the ovary. Sepals 4-12 persistent. Petals as many as calyx lobes emerging from the throat of the calyx, linear-oblong, flat, persistent. Stamens equal in number to the petals and opposite to them, or in greater numbers arranged in fascicles opposite to them, alternating with as many glands; filaments thread-like; anthers small, didymous. Ovary partly adherent 1-celled; styles 2-5, thread-like; stigmas simple or capitellate. Ovules numerous or few, attached to 2-5 parietal placentas. Capsule partly adherent, coriaceous, 2-5 valved, few-seeded. Seeds angular or oblong; testa crustaceous; albumen fleshy, cotyledons leafy. Trees or shrubs. Leaves alternate, stalked, ovate or lanceolate, glandulose, crenate or serrate. Stipules small. Flowers small in slender axillary branched panicles. *Jacq. Stirp. Amer.* 170, *t.* 183. *f.* 72. Blackwellia, *Juss.* Astrauthus, *Lour.* Racoubea, *Aubl.* Napimoga, *Aubl.* Cordylanthus, *Blume.* Nisa, *Norohn.* Myriantheia, *Thou.*

HOMALIUM CEYLANICUM. (Gardn.) A large tree 40-50 feet high, leaves ovate to elliptic or rarely obovate, with a rather sudden blunt acumination coarsely crenated, membranaceous to subcoriaceous, glabrous and shining above, glabrous beneath or slightly puberulous on the costa and veins, 3-6 inches long by 1½-2¾ broad, petioles 3-6 lines long, racemes axillary generally much longer than the leaves, erect or pendulous, puberulous, flowers densely hairy small glomerate 3-5 together pedicellate, sepals 4-6 linear oblong, petals 4-6 broader than the sepals about equal to them in length or a little longer, stamens equal in number to the petals and opposite them, glands as in the generic character, styles and placentas 3-5.—Blackwellia Ceylanica, *Gardn. Calc. Journ. of Nat. Hist. vol.* vii. *p.* 452. B. tetrandra, *Wight Icones. tab.* 1851.

This fine timber tree is not uncommon throughout our western forests up to 4000 feet, and I have also found it on the North Arcot hills near Madras, and it inhabits Ceylon, where it is called Leeyang. The timber is very strong and in use for building and various other purposes; the petals and calyx segments are quite similar in texture and appearance, though they differ somewhat in size, and the flowers are sometimes described as having a 8-12 parted perianth.

Analysis.

1-2. Magnified portions of a raceme.
3. A flower bud.
4. A flower, side view.
5. A 5-merous flower open, shewing 5 petals with 1 stamen opposite each, and the alternate glands opposite the calyx-segments, and 5 styles.
6. A 4-merous flower with 4 styles.
7. Anthers, front and back view.
8. A flower cut vertically, showing the placentas and ovaries.
9. Transverse section of an ovary with only 3 styles, shewing 3 parietal placentas. (All drawn from fresh specimens.)



Govindo. del.

Dumphy, Lith.

Homalium Ceylanicum, Gard.

HOMALIUM TRAVANCORICUM. (Nat. order Samydaceæ.)

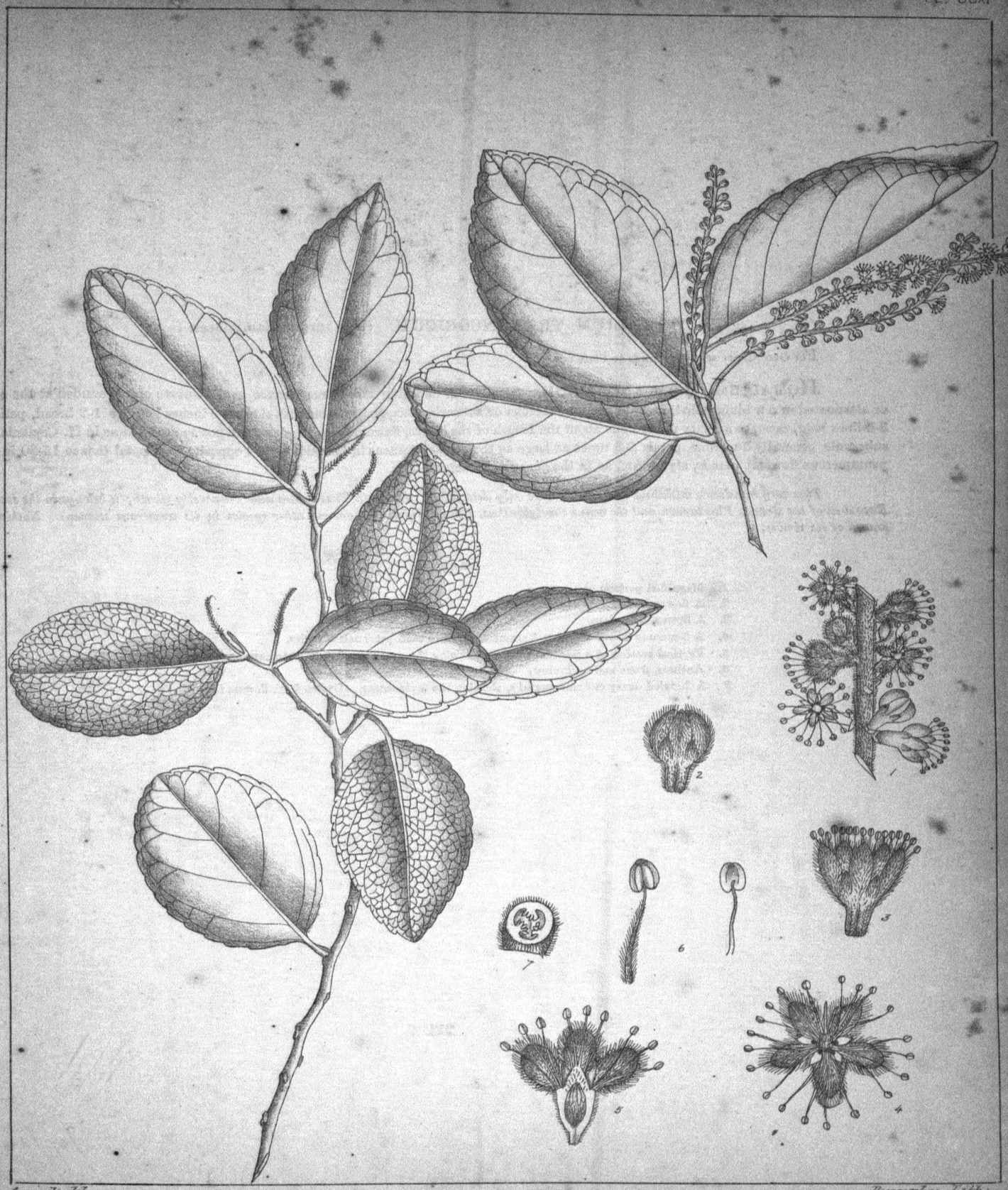
For Gen. Char. see letter press to Plate ccx.

HOMALIUM TRAVANCORICUM. (Bedd.) A middling sized tree, leaves oval to ovate quite rounded at the apex or attenuated into a blunt point, crenate, membranaceous or subcoriaceous, glabrous on both sides, 2-3 inches long by 1-2 broad, petioles 3-5 lines long, racemes axillary puberulous about the length of the leaves, flowers densely hairy small not so crowded as in H. Ceylanicum, subsessile, generally 5-merous, petals 2-3 times as large as the sepals, stamens in fascicles of 3-4 opposite each petal (hence 15-20 in the pentamerous flowers), glands, styles, &c., as in the generic character.

This very handsome middling sized tree I have only detected on the South Travancore and Tinnevelly ghats; it belongs to the section Racoubea of the Genera Plantarum, and the genus Cordylanthus, Blume, differing from our other species in its numerous stamens. Nothing is known of its timber.

Analysis.

1. Magnified portion of a raceme.
2. A flower bud.
3. A flower, side view.
4. A 5-merous flower showing 4 stamens opposite each petal and 3 styles.
5. Vertical section of a 5-merous flower, showing the ovaries and only 3 stamens to each petal.
6. Anthers, front and back view.
7. A 3-styled ovary cut transversely, showing the 3 placentas. (Drawn from flowers in spirit.)



Gouvrito del. Dumphy Lith.

Homalium Travancoricum (Bedd.)

TETRAMELES NUDIFLORA. (Nat. order Datisceæ.)

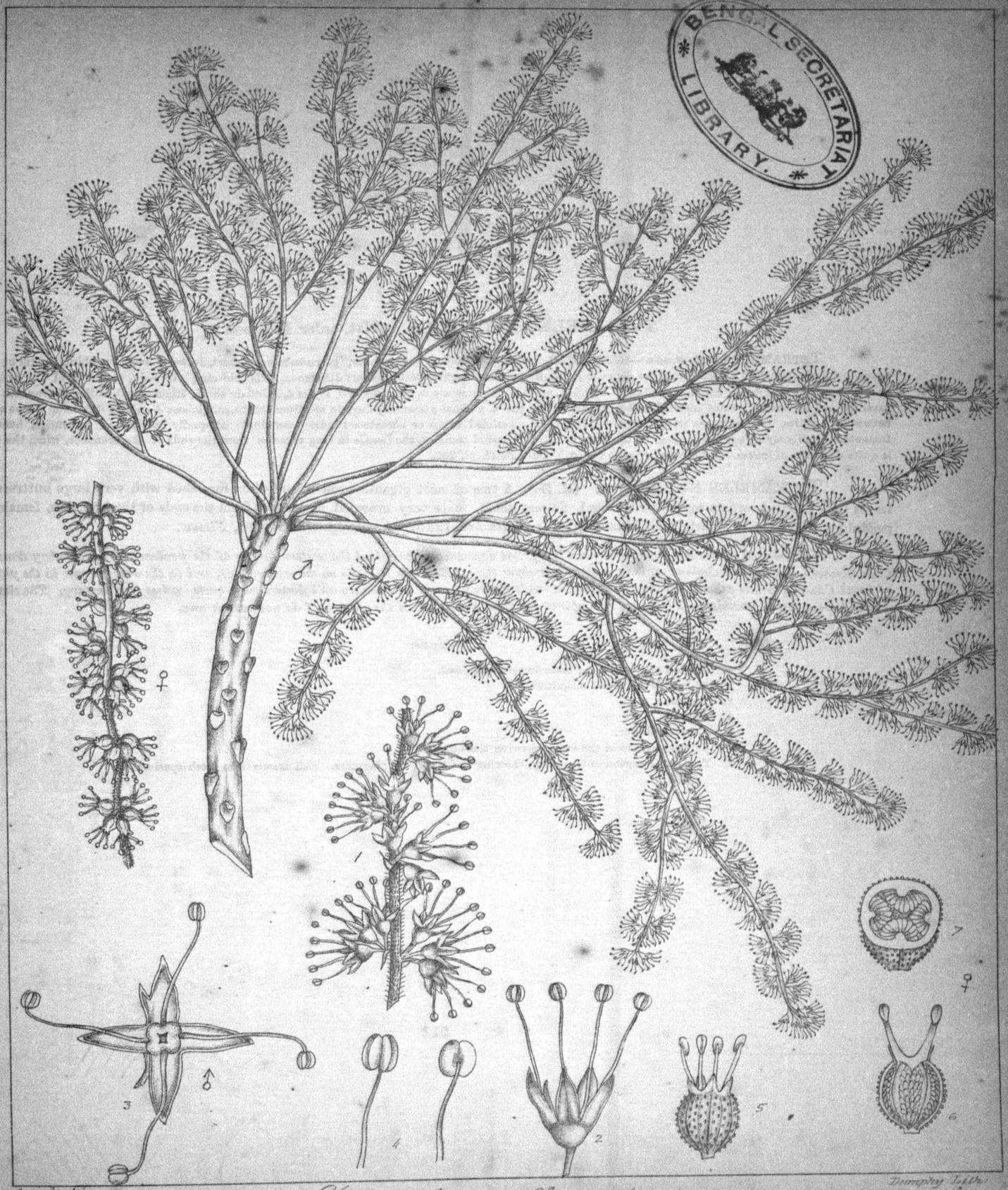
TETRAMELES. *R. Brown.*—GEN. CHAR. Flowers diœcious; *male flower*, calyx-tube very short, lobes 4 ovate or oblong equal or unequal, petals 0, stamens 4 placed round the depressed disk, filaments elongate, anthers short didymous, cells dehiscing introrsely, rudiment of the ovary 0 or 4 angled. *Female flower*, calyx-tube slightly 4-angled, teeth 4 short, petals 0, staminodia 0, styles 4, subulate short, stigmas rather dilated truncate and papillose on the inside, ovules inserted in several series on the 4 parietal placentas, capsule membranaceous subglobose 4-sulcate dehiscing at the apex between the styles. An immense tree, leaves deciduous long petioled ovate or cordate rotundate acuminate unequally toothed or subentire, beneath tomentose or slightly hirsute, flowers small the male in many flowered panicles, the female in long racemes from the ends of the branches, when the tree is quite destitute of leaves.—Anictoclea, *Nimmo in Grah. Cat. Bomb. pl.* 252.

TETRAMELES NUDIFLORA. (R. Br.) A tree of most gigantic growth, and often furnished with very large buttresses, leaves long petioled cordate acuminate serrated, flowers small, male very crowded in panicles from the ends of the branches, female in pendulous racemes.—Tetrameles Grahamiana, *Wight's Icones. tab.* 1956. Anictoclea Grahamiana, *Nimmo.*

This is one of the largest trees in the presidency, not uncommon throughout the western forests of the peninsula from Bombay down to Cape Comorin, and also in Ceylon; it is very abundant about the foot of the Nilgiris on the western side, and in the dense forests in the plains of South Canara, and is called Bolur in Canarese; it sheds its leaves early in January and flowers when quite leafless in February. The timber is said to be soft and worthless. I have not been able to represent the leaves in the plate, as I do not possess any.

Analysis.

1. Portion of a panicle of male flowers magnified.
2. A male flower much magnified.
3. The same open.
4. Anthers.
5. A female flower.
6. Vertical section of the same, shewing the ovules.
7. Transverse section of the ovary, shewing the 4 parietal placentas. (All drawn from fresh specimens.)



BENGAL SECRETARIAT LIBRARY.

Gawndo del. Dampfy Lith.

Tetrameles nudiflora. (R. Br.)

POLYSCIAS ACUMINATA. (Nat. order Araliaceæ.)

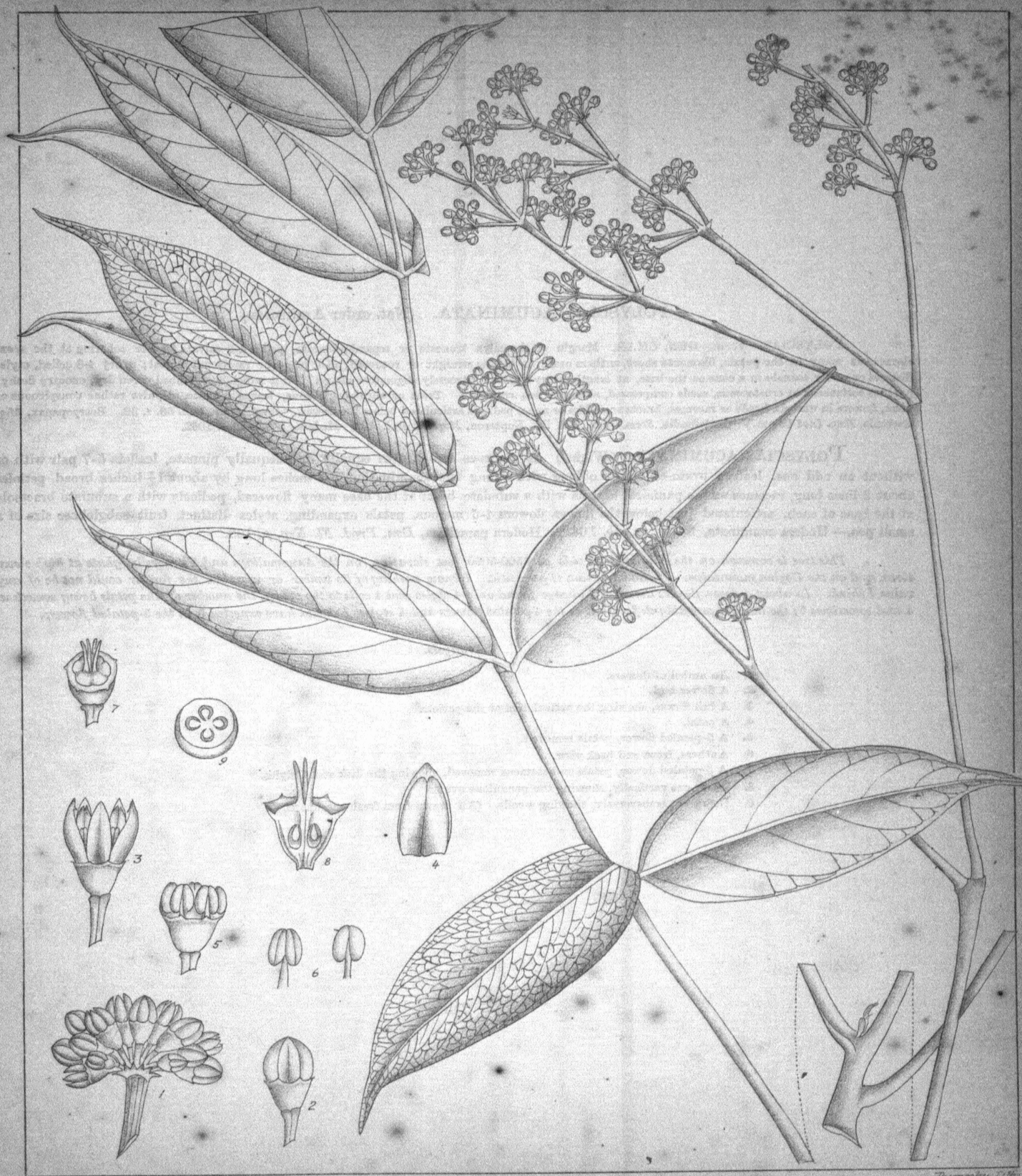
POLYSCIAS. *Forst.*—GEN. CHAR. Margin of the calyx truncate or repando-dentate, petals 4-8 valvate free or cohering at the apex, stamens as many as the petals, filaments short, anthers ovate or oblong straight or recurved, disk plane or rarely subconical; ovary 4-8 celled, styles distinct or rarely connate in a cone at the base, at length recurvo-patent introrsely stigmatose above. Fruit subglobose, ribbed when dry, exocarp fleshy; pyrenes coriaceous or crustaceous, seeds compressed, albumen not ruminate Trees or shrubs, glabrous, leaves pinnate, stipules rather conspicuous or none, flowers in umbels, heads or racemes, bracts scale-like or none, pedicels articulated below the flower. *Forst. Char. Gen.* 63. *t.* 32. Botryopanax, *Miq.* Gastonia, *Rœp.* (*not Comm.*) Grotefendia, *Seem. Jour. Bot.* ii. Eupteron, *Miq. Fl. Ind. Bat.* Hedera, *Wight Ic. t.* 1062.

POLYSCIAS ACUMINATA. (Wight.) A glabrous tree, leaves equally or unequally pinnate, leaflets 5-7 pair with or without an odd one, leaflets ovato-oblong to oblong with a long fine acumination, 3-4 inches long by about 1¼ inches broad, petioles about 2 lines long, racemes ample panicled, umbels with a subulate bract at the base many flowered, pedicels with a subulate bracteole at the base of each, articulated just below the flower, flowers 4-5 merous, petals expanding, styles distinct, fruit subglobose size of a small pea.—Hedera acuminata, *Wight, Ic. tab.* 1062. Hedera parasitica, *Don. Prod. Fl. Nep. p.* 188.

This tree is common on the Nilgiris west side at 4500-5000 *feet elevation, on the Annamallays and Tinnevelly ghats at high elevations, and on the Ceylon mountains. I have never seen it parasitic. I know nothing of its timber or uses, but the former could not be of any value I think. In about a dozen flowers dissected I always found only* 4 *styles and* 4 *cells to the ovary, the number of the petals being sometimes* 4 *and sometimes* 5*; the number probably differs, but as the* 4*-petaled flowers had* 4 *styles, I should have expected* 5 *in the* 5*-petaled flowers.*

Analysis.

1. An umbel of flowers.
2. A flower bud.
3. A full flower, showing the articulation at the petiole.
4. A petal.
5. A 5-petaled flower, petals removed.
6. Anthers, front and back view.
7. A 5-petaled flower, petals and stamens removed, showing the disk and 4 styles.
8. Ovary cut vertically, showing the pendulous ovules.
9. Ovary cut transversely, showing 4 cells. (All drawn from fresh specimens.)



Govindo, del. Dempsey, lith.

Polyscias acuminata, (Wight)

HEPTAPLEURUM RACEMOSUM. (Nat. order Araliaceæ.)

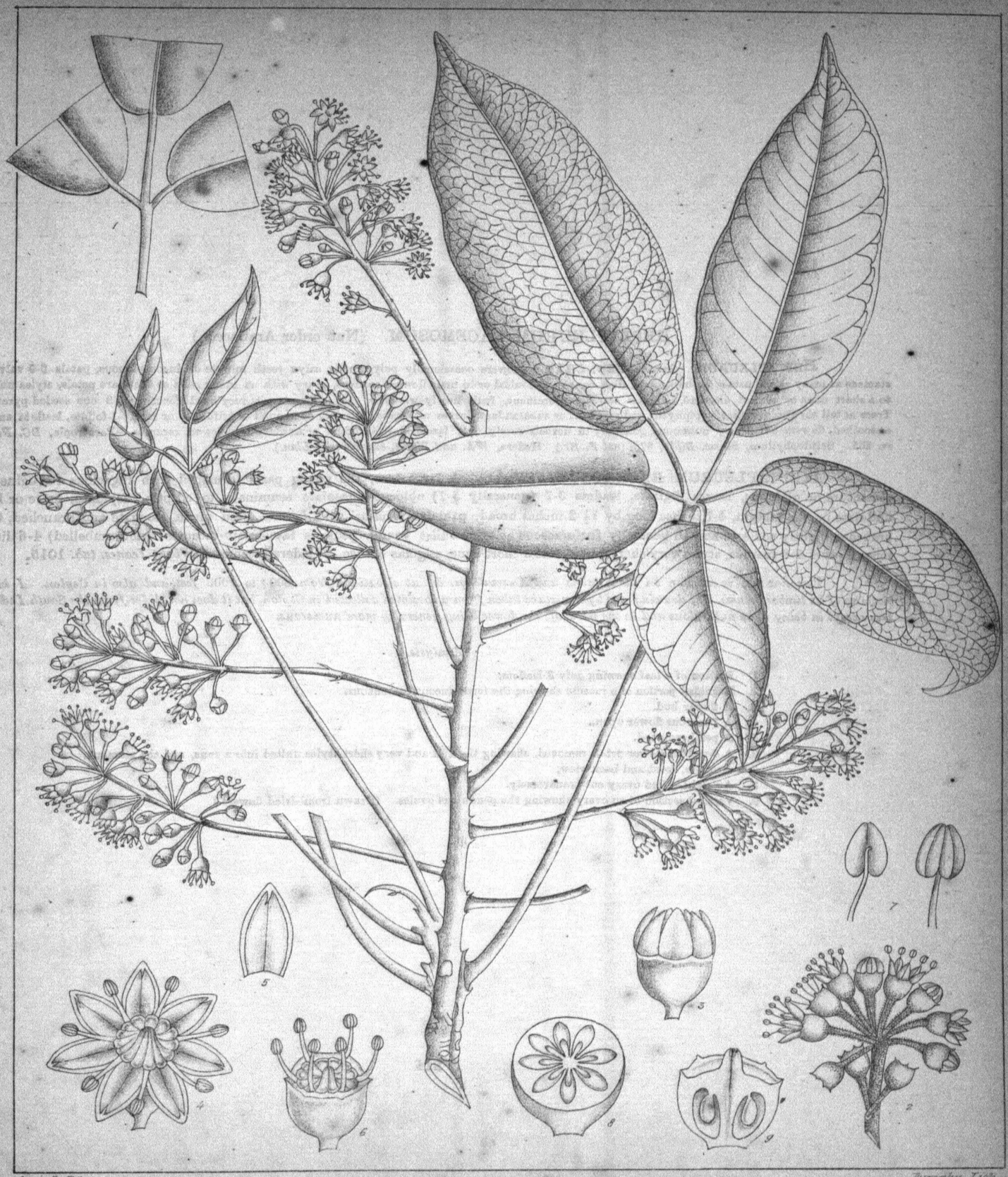
HEPTAPLEURUM. *Gærtn.*—GEN. CHAR. Flowers occasionally polygamous, calyx teeth minute or inconspicuous, petals 5-9 valvate, stamens as many as the petals, anthers ovate, disk convex or conical or in male flowers concave, ovary with as many cells as there are petals, styles united to a short cone or almost obsolete, stigmas scarcely prominent, fruit nearly globular, the endocarp not very hard forming 5-9 one seeded pyrenes. Trees or tall shrubs, sometimes epiphytic and scandent or subscandent, leaves alternate digitately compound or trifoliate or rarely 1-foliate, leaflets entire or toothed, flowers small very numerous generally in umbels rarely only fascicled in terminal or axillary panicles or racemes.—Paratropia, *DC. Prod.* iv. 265. Sciadophyllum, *Blume. Bijdr.* 875. (*not P. Br.*) Hedera, *WA. and Wight. exparte* (*not Linn.*)

HEPTAPLEURUM RACEMOSUM. (Wight.) A large tree, the young parts furnished with fugacious ferrugineous tomentum or glabrous, leaves digitate, leaflets 3-7 (generally 5-7) oblongo-lanceolate acuminate to elliptic cuspidate, more or less undulate on the margin, 4-7 inches long by 1½-2 inches broad, panicles terminal and lateral often much elongate and branched, the branches slightly aculeate and all generally furfuraceous at least whilst young, pedicels fasciculato-racemose (not umbelled) 4-6 lines long, flowers 5-8 merous, styles very short united into a short cone, stigmas obtuse.—Hedera racemosa, *Wight Icones. tab.* 1015.

This fine tree is common on the Nilgiris and Anamullays, &c. at elevations from 3000 to 7000 feet, and also in Ceylon. I know nothing of its timber or uses. The drawing was by a mistake taken from a specimen collected in Ceylon, but it does not differ from the South Indian tree except in being more puberulous and in the parts of the flower being generally more numerous.

Analysis.

1. Portion of a leaf shewing only 3 leaflets.
2. Magnified portion of a raceme shewing the ferrugineous tomentum.
3. A flower bud.
4. A 7-merous flower open.
5. A petal removed.
6. A 6-merous flower petals removed, shewing the disk and very short styles united into a cone, and the stamens.
7. Anthers, front and back view.
8. An eight-celled ovary cut transversely.
9. Vertical section of an ovary shewing the pendulous ovules. (Drawn from dried flowers.)



Gourindo del. Humphry Lith.

Heptapleurum racemosum (Wight.)

ALANGIUM LAMARCKII. (Nat. order Cornaceæ.)

ALANGIUM. *Lam.*—GEN. CHAR. Flowers hermathrodite, calyx-tube turbinate often sulcate, limb 5-10 toothed or truncate, petals 5-10 strap-shaped at length reflexed or revolute, valvate, stamens equalling in number or 2 or 4 times as many as the petals, filaments filiform or flat more or less villous, anthers linear elongate, cells narrow adnate to the connective dehiscing along the sides, disk cushion-shaped depressed in the centre lobed or crenulate, ovary 1-celled, style narrow clavate or filiform, stigma clavate or capitate 4-many-fid or many lobulate lobes conduplicate, ovule 1 pendulous from the apex of the cell, berry crowned with the limb of the calyx, seed oblong, testa thin, albumen ruminate easily crumbled, cotyledons foliaceous contortuplicate, radicle elongate cylindric thick. Trees or shrubs unarmed or spinescent, leaves alternate petiolate entire, flowers rather large fascicled in the axils.

ALANGIUM LAMARCKII. (Thw.) Varying in size from a large shrub to a considerable tree, branches often spinescent, leaves from linear-oblong to ovato-lanceolate obtuse at the apex or acute or acuminate, often velvetty beneath, 4-6 inches long by 10 lines to 2 inches broad, petioles about ½ inch long, petals 6-10, stamens twice as many as the petals, filaments hairy at the base, flowers whitish or purple fragrant solitary or aggregated in the axils of the leaves, drupe tomentose with a purplish rind filled with red pulp. *Thw. En. Pl. Zey. p.* 133. A. decapetalum, *Lam.* A. hexapetalum, *Lam.* A. tomentosum, *Lam.*

This is generally only a large shrub or small tree in the plains; but it grows to a considerable tree on our mountains, it is very common throughout the Peninsula and in Bengal, it is very abundant in some of the Locomotive Fuel Reserves in this Presidency, and is an excellent plant for this purpose as it yields a first class fuel, and grows most admirably from coppice. The tree is called Akola in Hindustanee, Udugu in Teligu, Alangi in Tamil (hence its botanical name), Ankola in Canarese and Eepaata in Ceylon. The wood is strong, very close and even grained, of a dark brown color, easily worked, and gives a smooth glossy surface and is capable of sustaining a great weight. A cubic foot unseasoned weighs 55·60 lbs. and 49 lbs. when seasoned, and its specific gravity is ·784, and it is well suited for ornamental work. In Gumsur a sort of wooden bell attached to the neck of cattle is made of this wood, which is said to be peculiarly adapted for producing sound. The sap-wood is white, close and even grained, and nearly as strong as the heart; the fruit is eaten but is not agreeable, the root and leaves are used medicinally.

Analysis.

1. A flower bud.
2. An open flower showing 8 reflexed strap-shaped petals (they vary from 6 to 10) and 16 stamens.
3. A flower, petals and stamens nearly all removed, shewing the calyx (7-toothed in this instance), the disk, style and stigma.
4. An anther highly magnified, shewing the filament very hairy at the base and the narrow adnate cells.
5. A flower cut vertically, shewing the insertion of the petals and stamens and the 1-celled ovary with the solitary pendulous ovule.

(All drawn from fresh specimens.)

Corrado, del.

Deerning, lith.

Alangium Lamarckii (Thw.)

MASTIXIA ARBOREA. (Nat. order Cornaceæ.)

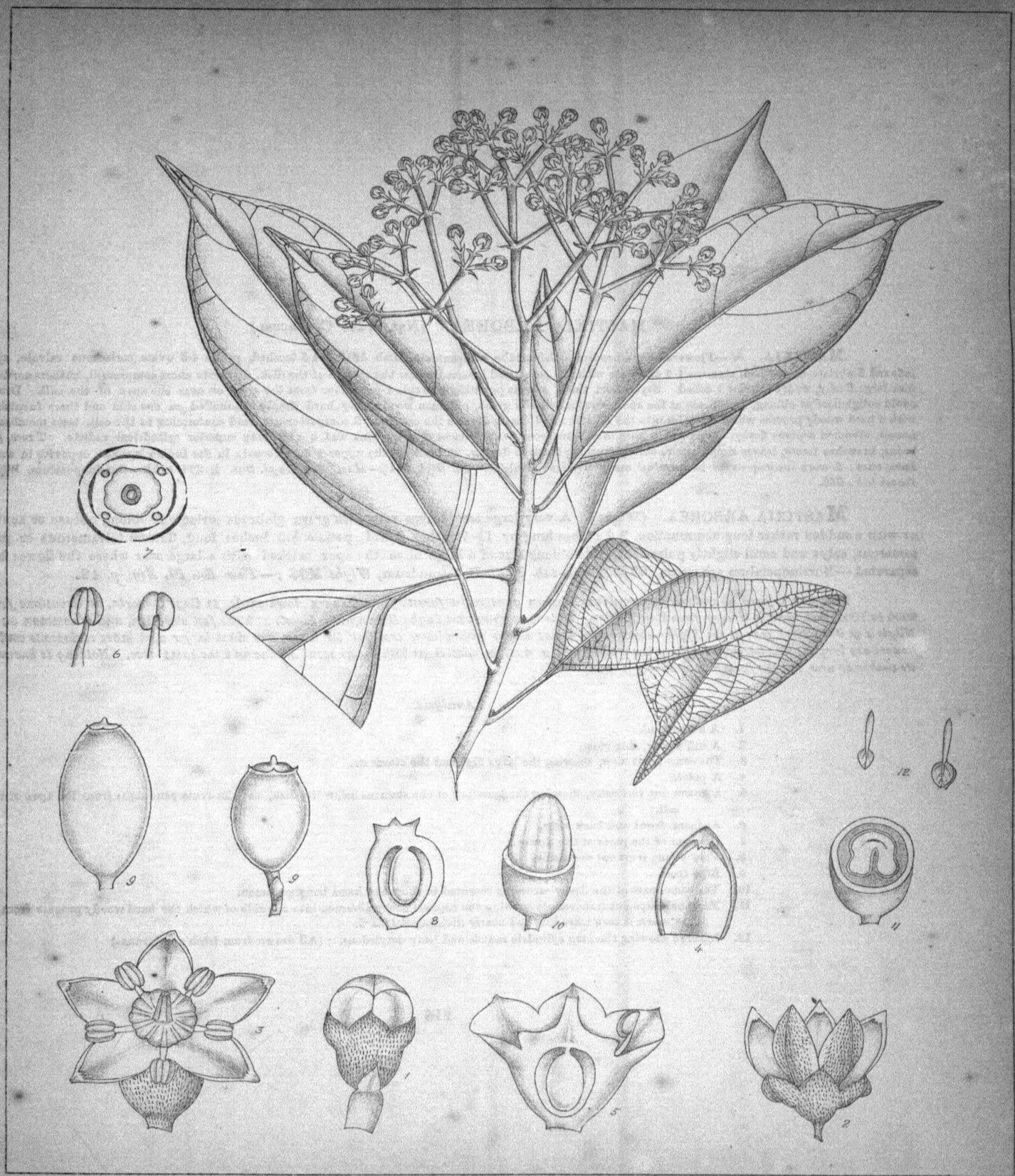
MASTIXIA. *Bl.*—Flowers hermathrodite. Calyx-tube campanulate, limb dilated 4-5 toothed, petals 4-5 ovate coriaceous valvate, apex inflexed fimbriate or toothed, stamens 4-5 alternate with the petals and inserted under the margin of the disk, filaments short compressed, anthers cordate, disk large fleshy, ovary inferior 1 celled. Style short thick, stigma punctiform, ovule 1 pendulous from the apex or near the apex of the cell. Drupe ovoid subglobose or oblong, umbilicate at the apex, sarcocarp fleshy green, putamen woody very hard deeply channelled on one side and there furnished with a hard woody process which intrudes into the albumen and nearly divides the cell into 2 compartments, seed conforming to the cell, testa membranaceous, albumen copious fleshy, embryo with thin membranaceous ovate foliaceous cotyledons and a very long superior cylindrical radicle. Trees, glabrous, branches terete, leaves simple entire oblong (turning black in drying, at least on the upper side) alternate in the Indian species, opposite in some Java ones; flowers inconspicuous in terminal many flowered panicles. *Bl. Bijd.* 651;—*Mus. Bot. Lugd. Bat.* i. 256. *t.* 58. Bursinopetalum, *Wight Icones tab.* 956.

MASTIXIA ARBOREA. (Wight.) A very large tree, leaves very dark green glabrous coriaceous oblong obtuse or acute or with a sudden rather long acumination, 2-9 inches long by 1½-4 inches broad, petiole ½-2 inches long, flowers tetramerous or pentamerous, calyx and corol slightly pubescent, fruit oblong size of a large olive the apex marked with a large scar where the flower has separated.—Bursinopetalum arboreum, *Wight Icones tab.* 956. B. tetrandrum, *Wight MSS.*;—*Thw. En. Pl. Zey. p.* 42.

This tree is very abundant in our dense Western ghat moist forests from Canara downwards to Cape Comorin, at elevations from 2000 to 7000 feet, and it is also found in Ceylon; it is most abundant in the Bolampatty forests at 2500 feet elevation, and is common on the Nilgiris at 6000-7000 feet, at the higher elevation it is not nearly such a large tree but its leaves are much larger and more coriaceous and its flowers are larger. The tetramerous form is certainly not a distinct species, as both forms occur on one and the same tree. Nothing is known of its timber or uses, but the former is probably good.

Analysis.

1. A flower bud.
2. A full flower, side view.
3. The same front view, showing the large disk and the stamens.
4. A petal.
5. A flower cut vertically, showing the insertion of the stamens below the disk, and the ovule pendulous from the apex of the cell.
6. Anthers, front and back view.
7. Diagram of the parts of the flower.
8. Very young fruit cut vertically.
9. Ripe fruit.
10. The same, part of the fleshy sarcocarp removed to show the hard bony putamen.
11. Fruit or drupe cut transversely showing the copious fleshy albumen into one side of which the hard woody process from the putamen is seen intruding and nearly dividing it into 2.
12. Embryo showing the long cylindric radicle and leafy cotyledons. (All drawn from fresh specimens.)



Gurnsbo del.

Dunapley Lith.

Mastixia arborea (Wight)

ORDER XXXIX—MELASTOMACEÆ.

Calyx-tube enclosing the ovary, and either cohering with its angles, leaving intermediate cavities, or entirely free or more or less adnate to it, the limb entire or with 3 to 5 or rarely 6 lobes, or teeth, usually imbricate in the bud. Petals as many as calyx-lobes, inserted at the orifice of the calyx-tube, imbricate (usually contorted) in the bud. Stamens usually twice as many, sometimes only as many as petals and inserted with them, the filaments curved down in the bud ; anthers 2-celled, opening in 1 or 2 pores at the top or very rarely in longitudinal slits, and before flowering their tips are usually contained in the cavities between the ovary and calyx, the connective often variously extended or thickened. Ovary enclosed in the calyx-tube and adnate to it, or more or less free, with 2 to 6 or rarely more cells, with the placenta in the axis, or rarely 1-celled, by the abortion of the partitions. Style simple, with a minute or capitate or peltate stigma. Ovules several rarely 2 only to each placenta, anatropous. Fruit enclosed in the calyx or combined with it, either succulent and indehiscent, or bursting irregularly, or capsular and opening in as many valves as there are cells. Seeds usually numerous and small, straight or *cochleate* (i. e., curved somewhat like an univalve shell), without albumen ; testa coriaceous, crustaceous or membranous. Embryo straight or curved ; cotyledons plano-convex or thick and variously-folded ; radicle short. Herbs, shrubs or rarely trees. Leaves opposite, simple, petiolate, 3 to 11 nerved, or in *Memecyleæ* 1 nerved and penniveined, entire or rarely serrulate. Stipules none. Flowers usually in terminal panicles or clusters, rarely axillary or solitary.

SUB-ORDER I. MELASTOMEÆ.—Ovary 2-6 celled with the placenta in the axis, fruit many seeded, seed minute ; embryo small terete or subglobose.

This suborder is largely represented in S. India by very beautiful herbs, under-shrubs and parasitic plants belonging to the genera Melastoma, Osbeckia, Sonerila, Medinella and Kendrickia, but it does not yield any trees or large shrubs.

SUB-ORDER II. MEMECYLEÆ.—Ovary 1-celled with a central placenta, fruit 1-5 seeded, embryo large, cotyledons plano-convex or subfoliaceous.

This suborder is only represented by one genus, Memecylon ; the species are numerous, particularly in Ceylon ; they are generally small trees but often only shrubs.

MEMECYLON. LINN.

For Gen. Char. see letter-press to Pl. ccvi.

1. MEMECYLON CAPITELLATUM, *Linn.*—A small tree or large shrub, branches terete or subterete, leaves elliptic oblong, narrowed at both ends and rather obtusely pointed at the apex 1½-4 inches long by ⅔rd to 1¾ inches broad, (petioles 1-2 lines long) sub 3-nerved from the base the 2 lateral nerves forming a looped vein not far from the margin into which the rather prominent primary veins run, peduncles axillary 3 lines to 1 inch long, flowers 3-6 capitate sessile or subsessile, the disk of the calyx radiately 8 winged, berry succulent very shortly pedicellate, globose smooth prominently crowned with the limb of the calyx. *Linn. Spec. Pl. p.* 497.

Ceylon, not uncommon up to an elevation of 1000 feet. Tinnevelly and Travancore ghats up to 2000 feet, the Peninsula plant, which is a small tree, is figured at Pl. ccvi. with M. umbellatum, it only differs from the Ceylon form in having much shorter peduncles ; the tree is called Welli-kaha in Ceylon.

2. MEMECYLON EDULE, *Roxb.*—A small tree or large shrub, branches terete, leaves oval to elliptic or rarely obovate, obtusely pointed, 2-6½ inches long by 1-3½ broad, shining firm, and the penninerved venation very obscure, petioles 2-4 lines long, peduncles 3-4 times longer than the petioles, compound, generally from scabrous elevations at the old axils below the leaves but sometimes axillary, pedicels colored equalling the calyx, disk of the calyx radiately winged, berry succulent very shortly pedicellate globose smooth, crowned by the limb of the calyx. *Roxb. Fl. Ind.* ii. 260. Memecylon Royenii, *Bl. Mus. Bot.* ii. 360. M. Heyneanum, *Wight Icones tab.* 278.

This small tree or shrub is very common in the jungles on the eastern side of this presidency and in Ceylon ; the dark blue colored fruit is eaten by the natives, it is called Alli in Teliga, and Anjun and Kurpá on the Bombay ghats ; the wood is strong and serviceable.

3. MEMECYLON SYLVATICUM, *Thw.*—A small tree, branches terete, leaves ovate or elliptic, rather abruptly acuminate subsessile or narrowed at the base into a very short petiole, coriaceous, very obscurely penniveined, 1½ to 5½ inches long by ¾-2½ inches broad, peduncles short more or less compound, pedicels very short and thick, flower bluish-purple, disk of the calyx radiately 8 winged, berry spherical dark purple succulent 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 110.

Ceylon, common in forests 2000-4000 feet elevation, nearly allied to *edule* but differing in its more abruptly acuminated leaves, shorter petioles and peduncles and somewhat larger flowers.

4. MEMECYLON LEUCANTHUM, *Thw.*—A small tree, branches obscurely 4 angled, leaves rather shining roundish to ovate or elliptic, acute at the base, abruptly acuminated with a short obtuse point, 1½-2½ inches long by ¾-1½ inches long, (petiole 1 line long) penniveined with the primary veins rather prominent, peduncles rather elongated, flowers white lax, calyx-disk radiately 8 winged, petals reflexed, pedicels twice as long as the calyx, berry spherical. *Thw. En. Pl. Zey. p.* 110.

Ceylon, central provinces 3000-5000 feet elevation.

5. MEMECYLON RHINOPHYLLUM, *Thw.*—A small tree, branches obscurely 4 angled, leaves opaque veinless ovate or elliptic much acuminated at the apex, acute at the base, subsessile, 2-3 inches long (of which the acumen is ½ an inch) ¾-1½ inches broad, pe-

duncles corymbose or umbellato-corymbose, compact many flowered, flowers small pale blue, pedicels slender nearly twice as long as the calyx, disk of the calyx radiately 8 winged, berry spherical dark purple 3 lines in diameter. *Thw. En. Pl. Zey. p.* 110.

Ceylon, central provinces up to 3000 feet elevation.

6. MEMECYLON MACROCARPUM, *Thw.*—A small tree, branches terete, leaves very coriaceous rotundate obtuse more or less narrowed at the base, 3-4 inches long by 2½-3½ inches broad, petioles 2 lines long, peduncles short, pedicels about equalling the calyx, disk of the calyx radiately 8 winged, berry large, 8 lines in diameter (immature) spherical. *Thw. En. Pl. Zey. p.* 110.

Ceylon, Ambagamwa at an elevation of 3000 feet.

7. MEMECYLON UMBELLATUM, *Burm.*—For description, &c. see Pl. cevi.

8. MEMECYLON REVOLUTUM, *Thw.*—A small tree, leaves coriaceous, oblongo rotundate obtuse subcordate, revolute at the margins, 2-3 inches long by nearly as broad, primary veins a little prominent, petiole 1 line long, peduncles many flowered more or less elongated and branched, pedicels one half longer than the calyx, flowers small, calyx-disk plane, petals white, berry dark-purple 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 111.

Ceylon, Rambodde at an elevation of 5000 feet.

9. MEMECYLON RUBRO-CÆRULEUM, *Thw.*—A tree 30 feet high, leaves veinless cuneato-ovate a little narrowed towards the apex retuse, paler beneath, 1½-2 inches long by ½-1 inch broad, (the young ones reddish) petioles 3 lines long, peduncles solitary or twin bearing a compound umbel of the same length, pedicels a half longer than the calyx, calyx reddish obscurely 4 toothed, disk plane, petals blue with a pale margin. *Thw. En. Pl. Zey. p.* 415.

Ceylon, Matella east.

10. MEMECYLON ANGUSTIFOLIUM, *Wight.*—A shrub 6-8 feet, young branches 4 angled, leaves veinless or sub-veinless dark green and shining above, pale beneath, channelled at the costa, linear lanceolate attenuated upwards into a very blunt point, about 2½ inches long by 4-6 lines broad, petiole 1 line long, peduncles axillary or from the old axils below the leaves from scarcely 1 line to 4 lines long, thick with a tubercled dilated apex, pedicels slender 1-3 lines long numerous, calyx-disk plane, petals blue, berry dry or nearly so, dark purple smaller than a pea. *Wight's Icones. tab.* 276.

Tinnevelly ghats banks of rivers. Ceylon, common on banks of rivers up to 2000 feet, perhaps only a narrow leaved form of the variable Memecylon umbellatum.

11. MEMECYLON ROSTRATUM, *Thw.*—A small tree, leaves elliptic abruptly rostrato acuminate with the point obtuse, acute at the base, 1½-2½ inches long (of which the acumen is ½ inch) by ½-1¼ inches broad, inconspicuously venose, petiole 1½ lines long, peduncles short or almost obsolete many flowered. pedicels 2-3 times longer than the calyx, flowers small, calyx-disk plane, petals white, anthers blue, berry spherical. *Thw. En. Pl. Zey. p.* 111.

Ceylon, central provinces 3000-4000 feet elevation.

12. MEMECYLON FUSCESCENS, *Thw.*—A shrub or small tree, leaves membranaceous shining obscurely venose ovate or elliptic more or less narrowed at the base, 1½-3 inches long (the acumen 4-6 lines) by 6-11 lines broad, very shortly petiolate, peduncles short sparingly branched, few flowered, pedicels nearly obsolete, calyx-disk plane, berry spherical 4 lines in diameter. *Thw. En. Pl. Zey. p.* 111.

Ceylon, Kokool corle at no great elevation.

13. MEMECYLON MACROPHYLLUM, *Thw.*—A shrub, leaves coriaceous cordato or subcordato-lanceolate, very shortly petiolate, 6-12 inches long by 2-3½ inches broad, peduncles very short or almost obsolete, pedicels short, calyx-disk plane, petals pale blue, berry spherical 4 lines in diameter. *Thw. En. Zey. p.* 111.

Ceylon, Ambagamwa and Pasdoon corle at 1000-3000 feet elevation (perhaps not distinct from No. 14.)

14. MEMECYLON JAMBOSOIDES, *Wight.*—A shrub, branches terete, leaves from ovate or ovato-lanceolate to narrow lanceolate, terminating in a long finely pointed acumination, very firm and coriaceous, 6-12 inches long by 1½-2½ inches broad, 3 nerved from the base, the lateral nerves submarginal and forming a broad vein into which the primary veins run, all prominent particularly beneath, petioles 4-6 lines long, inflorescence axillary or from the old axils, peduncles scarcely any beyond a bracteated tubercle, pedicels about the length of the calyx, flower-buds conical pointed, calyx-disk radiately 8 winged, wings not very prominent, petals blue, berry spherical 4 lines in diameter. *Wight Icones. tab.* 277 ; *Ill. p.* 215.

Common on the Tinnevelly and Travancore ghats up to 3000 feet, and in Ceylon. I have some doubts if the Ceylon plant is the same as the Indian one, the leaves are of a much deeper green and the venation much less prominent, the flowers smaller and on distinct peduncles. My specimens are not perfect enough to see if the disk of the calyx is radiately winged, which it distinctly is in the Indian plant.

15. MEMECYLON PROCERUM, *Thw.*—A tree 30-40 feet high, leaves ovato-lanceolate gradually acuminate channelled at the costa rounded or slightly attenuated at the base, paler beneath, 6-10 inches long by 1¾-5 inches broad, primary veins scarcely conspicuous, petiole sulcate above 3-5 lines long, peduncles and pedicels none or almost obsolete, calyx 2 lines in expansion, plane on the inside, berry spherical crowned with the calyx limb. *Thw. En. Pl. Zey. p.* 415.

16. MEMECYLON CUNEATUM, *Thw.*—A small tree, leaves coriaceous opaque veinless, rotundate or oblong obtuse cuneate at the base, 1-2½ inches long by ½-1½ inches broad, petiole 1 line long, peduncles none, flowers crowded on very short pedicels, flower bud acute, margin of the calyx subentire, disk within plane, petals pale blue, berry spherical. *Thw En. Pl. Zey. p.* 112.

Ceylon, central province, at 3000 feet elevation.

17. MEMECYLON ORBICULARE, *Thw.*—A small tree, leaves coriaceous rather shining, orbicular, obscurely and obtusely acuminate or retuse, 1½-2 inches long by about the same breadth, very shortly petioled, primary veins scarcely conspicuous, peduncles short or nearly obsolete, pedicels about as long as the calyx, calyx-disk plane, petals blue. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Hinidoon corle at 1000 feet elevation.

18. MEMECYLON OVOIDEUM, *Thw.*—A small tree, leaves very coriaceous opaque obovato-rotundate retuse subsessile, 2-4 inches long by 1¾-3 inches broad, peduncles nearly obsolete, pedicels fasciculate crowded, about equalling the calyx, calyx disk plane, berry ovoid 6 lines long 4 lines broad dark purple. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Ambagamwa district near Adam's Peak, 4000-5000 feet elevation.

19. MEMECYLON TERMINALE, *Dalz.*—A shrub 2-3 feet high, branches dichotomous slender young ones 4 angled, leaves sessile or subsessile lanceolate acuminate obscurely penniveined 2-2½ inches long, below the middle 9-10 lines broad rounded at the base, peduncles axillary and terminal solitary ½ an inch long, pedicels umbellate ½ the length of the peduncle, berry globose dry size of a large pea. *Dalz. in Hook. Jour. of Botany, vol.* iii. *p.* 121.

On the Canara ghats.

20. MEMECYLON AMABILE, *Bedd.*—A small tree or large shrub, the young branches acutely 4 angled, young leaves a deep blue color, leaves subcoriaceous veinless opaque deep green above very pale beneath subsessile from ovate to cordato-lanceolate with a gradually attenuated blunt point, 2-3 inches long by 10-14 lines broad, petioles 1 line long or sometimes none, peduncles axillary and terminal solitary or twin slender 6-9 lines long umbelliferous at the apex sometimes branched, dilated at the apex into a scaly receptacle, pedicels slender 2-3 times as long as the calyx, with a small bract at the base of each, calyx-lobes very small or obsolete, petals rounded, disk plane within, flowers deep blue small crowded, placenta 5 ovuled.

Common on the South Canara ghats up to 2000 feet elevation.

21. MEMECYLON GRACILE, *Bedd.*—A small tree or large shrub, young branches obsoletely 4 angled, leaves subcoriaceous ovate with a long gradually blunt acumination quite veinless of a bright green on both sides or a little paler beneath, 1½-1¾ inches long by 8-9 lines broad, petioles 1-2½ lines long, peduncles axillary solitary drooping slender 4-6 lines long 3 flowered bracteated at the apex, pedicels 2-3 inches long with 2 bracteoles a little above the base, flowers small, calyx white, disk radiately winged within, petals pale blue, placenta 3-4 ovuled.

Travancore and Tinnevelly ghats.

22. MEMECYLON ELLIPTICUM, *Thw.*—A small tree branchlets 4 angled, leaves rather shining elliptic abruptly rostrato-acuminate with the point obtuse, rounded or sparingly attenuated at the base, 2-3 inches long (of which the acumen is ½ an inch) by 1¼-1¾ inches broad, petiole ½ a line long, inconspicuously venose, peduncles very short or nearly obsolete, pedicels crowded about equalling the calyx, calyx plane within, petals white. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Singhe rajah forest between Galle and Ratnapoora at no great elevation.

23. MEMECYLON ELEGANTULUM, *Thw.*—A shrub, branchlets 4 angled, leaves lanceolate with a long obtuse acumination, more or less narrowed at the base obscurely venose, 2-3 inches long (of which the acumen is ½-¾ inch) by 6-8 lines broad, petioles very short, peduncles filiform somewhat elongated sparingly branched few flowered, pedicels subsolitary, one half longer than the calyx, calyx plane within, flowers white, berry spherical the size of a pea. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Suffragram district at no great elevation.

24. MEMECYLON VARIANS, *Thw.*—A small tree, branchlets 4 angled, leaves opaque obscurely venose from ovate or elliptic acuminate, acute at the base to rotundate or oblong obtuse at both ends, 1-3 inches long by ½-1½ inches broad, petiole 1-1½ lines long, peduncles short or a little elongated, flowers capitellate very shortly pedicelled, calyx plane within, petals blue or rarely white, berry spherical 3-4 lines in diameter. *Thw. En. Pl. Zey. p.* 112.

Ceylon, central provinces 2000 to 5000 feet.

25. MEMECYLON PARVIFLORUM, *Thw.*—A small tree, branchlets 4 angled, leaves coriaceous opaque veinless rounded or oblong obtuse or retuse or abruptly acuminated with a short obtuse point cuneate at the base, ½-2 inches long by 3-8 lines broad, petiole ½ to 1 line long, peduncles very short or nearly obsolete, flowers capitellate subsessile, calyx plane within, petals white, berry spherical. *Thw. En. Pl. Zey. p.* 113.

Ceylon, central provinces 4000-7000 feet.

26. MEMECYLON PHYLLANTHIFOLIUM, *Thw.*—A shrub or small tree, branches obscurely 4 angled, leaves linear to spathulate very rugose 4-6 lines long by 1-2 lines broad, petioles 1 line long, peduncles axillary 2-3 lines long, 3 flowered at the apex, flowers sessile very small. *Thw. MSS. C. P.* 3900.

Ceylon.

27. MEMECYLON HOOKERI, *Thw.*—An erect shrub 8-12 feet high, sparingly branched, branchlets 4 winged, leaves cordato-lanceolate acuminate sessile, 6-12 inches long by 1½-3 inches broad, the costa, primary veins and the intramarginal vein very prominent beneath, peduncles short or nearly obsolete, pedicels rather long, calyx plane within, petals blue, berry spherical 4 lines in diameter dark purple. *Thw. En. Pl. Zey. p.* 113.

Ceylon, Ambagamwa district in shady forests on banks of streams 1,000 feet elevation.

28. MEMECYLON WIGHTII, *Thw.*—A small tree, branchlets 4-winged, leaves rather shining, cordato-lanceolate more or less acuminate obscurely venose, 2-5 inches long by ¾-1½ inches broad, petiole 1 line long, peduncles very short or nearly obsolete, pedicels crowded rather long, calyx plane within, petals blue, berry spherical 3-4 lines in diameter. *Thw. En. Pl. Zey. p.*113 (*excl. syn*).

Ceylon, central provinces 3000-4000 feet elevation.

29. MEMECYLON ARNOTTIANUM, *Wight. MSS.*—A small tree or large shrub 10-12 feet high, branches terete, the young leaves reddish, leaves rather obscurely 3 nerved, copiously covered with minute scabrous raised dots, ovate with a long terminal blunt acumination, 1-4 inches long by ½-2 inches broad, peduncles slender axillary 8-12 lines with 3-5 sessile flowers at the apex, flowers small, white, calyx-disk plane, berry spherical size of a pea, dark purple. *Thw. En. Pl. Zey. p.* 113. Eugenia ? capitellata, *Arnt. in Walp. Rep.* ii. 182.

Ceylon, Hinidoon and Pasdoon Corle at no great elevation.

30. MEMECYLON GARDNERI, *Thw.*—A small tree, young branches narrowly 4-winged, leaves 3 nerved opaque pellucido-punctulate, rounded elliptic or rhomboideo-oblong abruptly and shortly acuminated with an obtuse or retuse point, narrowed at the base into the petiole, 1-3 inches long by ½-1½ inches broad, petiole 1 line long, capitate 3 flowered shortly peduncled or sessile, flowers white, calyx plane within, berry spherical the size of a pea, dark purple. *Thw. En. Pl. Zey. p.* 113.

Ceylon, central provinces, at an elevation of 2000-5000 feet.

ORDER XL—LYTHRARIEÆ.

Calyx-tube free, but usually enclosing the ovary; lobes or primary teeth 4, 5, or sometimes more, very rarely 3, valvate in the bud, the sinus sometimes produced externally into as many accessory teeth. Petals as many as primary calyx-teeth or lobes, rarely deficient, inserted at the top of the calyx-tube, usually crumpled in the bud. Stamens as many or twice as many as petals or fewer, or rarely indefinite, inserted in the calyx-tube at various heights; filaments inflected in the bud; anthers versatile, with parallel cells opening longitudinally. Ovary rarely inferior (in Punica and Axinandra only) in other genera free from the calyx, but usually enclosed in its tube 2-or more celled, or rarely 1-celled by the abortion of the partitions; style simple, the stigma capitate or rarely 2-lobed. Ovules usually numerous, anatropous, attached to the axis, or very rarely parietal. Fruit a membranous coriaceous or hard capsule, variously dehiscent, enclosed in or surrounded by the persistent calyx, the valves usually detaching themselves from the central persistent placentiferous column. Seeds without albumen; testa coriaceous, membranous or rarely thick; embryo straight; cotyledons oblong or orbicular-cordate, radicle short; or rarely cotyledons small and radicle long. Herbs, shrubs or trees, Leaves opposite, verticillate or sometimes alternate, entire, without stipules. Flowers in axillary or terminal panicles cymes or clusters, rarely solitary.

Tribe Lythreæ.—Shrubs or trees, calyx coriaceous or herbaceous often much striated or costate, flowers large or rarely small, petals generally corrugated.

Ovary superior.	
Calyx curved	...WOODFORDIA.
Calyx straight	...
Stamens twice as many as petals, calyx 12 toothed	...PEMPHIS.
Stamens twice as many as petals, calyx 4 partite	...LAWSONIA.
Stamens indefinite, capsule 3-6 celled, forest trees...	...LAGERSTRÆMIA.
Stamens indefinite, berry 10-15 celled, maritime trees	...SONNERATIA.
Anomalous genera.	
Ovary inferior.	
Petals 5-7, stamens indefinite, ovary many celled	...PUNICA.
Petals cohering in a cup, stamens 10, ovary 6 celled	...AXINANDRA.

The genus Lagerstræmia yields valuable timber trees. L. microcarpa (or the Ven Tek) is one of the commonest timber trees in all our western forests, and on the eastern side of the presidency its place is taken by L. parviflora. L. Reginæ is also very abundant about our Western ghats, and L. lanceolata not uncommon; beyond this genus the order is of no importance to the forester. Pemphis and Sonneratia are small sea coast trees. Lawsonia a shrub or small tree much used as a hedge plant. Woodfordia an ornamental shrub or small tree of no value. Axinandra a Ceylon tree, and Punica (the Pomegranate) is introduced to Southern India from the North.

Crypteronia and Duabanga are transgangetic genera yielding trees.

Of herbaceous plants not coming under this Flora there is only the genus Ammania, represented in South India by a few small herbs.

WOODFORDIA. Salisb.

Gen. Char. Calyx curved colored tubular obsoletely striated, lobes 6 short with as many minute accessory teeth, petals 6 small inserted on to the top of the tube between the lobes, sometimes wanting. Stamens 12 inserted into the base of the calyx much exserted alternately longer, filaments filiform, anthers broadly ovate, ovary included in the tube of the calyx, sessile oblong 2-celled, style filiform curved attenuated, stigma punctiform, ovules very numerous inserted on to the thick placenta adnate to the axis of the ovary, capsule included in the calyx linear oblong compressed membranaceous, 2-celled, loculicidally 2-valved, placentas swollen many seeded, seed small densely crowded obcuneate subcompressed, testa coriaceous papilloso-pilose, cotyledons oblong compressed 2 auricled at the base, radicle very short. A shrub or small tree, pubescent, leaves opposite subsessile ovato-lanceolate entire and together with the calyx black dotted, peduncles axillary several flowered, flowers scarlet.—Grislea, *Roxb.* (not *Linn.*)

1. Woodfordia tomentosa, *Roxb.*—A large shrub or small tree, branchlets pubescent, leaves ovato-lanceolate somewhat cordate at the base sessile under side hoary and black dotted, upper more or less glabrous, 3-4½ inches long by ¾-1 inch broad, racemes axillary and below the leaves on the old axils, sometimes compressed, bearing 5-15 flowers, flowers rather large bright scarlet.—Grislea tomentosa, *Roxb. Fl. Ind.* ii. *p.* 234. Woodfordia floribunda, *Salisb. Parad. Lond. tab.* 42 ;—*Bl. Mus. Bot. tab.* 45.

This beautiful shrub or small tree is very common in many jungles and subalpine tracts throughout India, it is more abundant on our eastern coast, than on the west side, and it is also found in China, Africa and Madagascar, it flowers during the cold and beginning of the hot season, it is called Dowaiee in Hindoostanee and Surteylee by the Gonds in the Godavery forests, the flowers are in use as a dye and an infusion of the leaves is employed as a substitute for tea ; the wood is only used as fuel.

Analysis of Genera, Pl. XIV, fig. 4.

1. A flower bud (magnified.)
2. A full flower (life size.)
3. The same (magnified) cut open.
4. The young fruit.
5. Ovary cut vertically.
6. The same cut transversely.
7. An ovule (much magnified.)
8. A seed (much magnified.)
9. Embryo. (All copied from Blume's figure.)

PEMPHIS. Forst.

Gen. Char. Calyx campanulate, slightly striate, with 6 short erect triangular primary lobes or teeth, the sinuses produced into as many small accessory spreading ones. Petals 6, oval. Stamens 12, shorter than the calyx, and attached rather above the middle of the tube. Ovary small, 3-celled at the base only, with several ovules in each cell ; style rather thick, with a broad capitate stigma. Capsule globular, enclosed in the calyx, transversely circumsciss. Seeds angular or compressed, the testa thick with the angles often expanded into narrow thick wings. A shrub or small tree. Leaves opposite. Flowers solitary in the axils. *Benth. Fl. Aust.* iii. *p.* 300. Maclellandia, *Wight.*

The genus is limited to a single species.

1. Pemphis acidula, *Forst.*—A small and bushy or tall and spreading shrub or small tree, more or less hoary with a minute tomentum. Leaves oblong, obtuse, narrowed into a short petiole, rather thick, 1 nerved, about ½ inch long. Flowers in the upper axils, on pedicels shorter or rarely rather longer than the leaves. Bracteoles none, calyx about 2 lines long the accessory lobes much shorter than the primary ones. Petals 3-4 lines long. Fruiting calyx not much enlarged. *Blume Mus. Bot.* ii. *t.* 43. Maclellandia Griffithiana, *Wight Ic. t.* 1996 ;—*Benth. Fl. Aust.* iii. *p.* 300.

Sea coast and tidal backwaters in Travancore, Tinnevelly, Malabar and Ceylon, also throughout tropical Asia, the Pacific islands and in Australia.

Analysis of Genera, Pl. XIV, fig. 5.

1. A fragment of a branch in flower and fruit (life size.)
2. A flower bud.
3-4. Full flower petals removed.
5. Ovary cut vertically.
6. The same cut transversely.
7. The fruit.
8. Vertical section of the same.
9. The seed (much magnified.)
10. The same (life size.)
11. Seed cut vertically.
12. Embryo. (All copied from Blume's drawing.)

LAWSONIA. Linn.

Gen. Char. Calyx tube broadly turbinate ; lobes 4 ovate-triangular, the sinuses acute without accessory lobes. Petals 4 broad, sessile. Stamens 8, inserted round an annular disk at the top of the calyx-tube, almost in the same row as the petals, and alter-

nating with them in pairs ; filaments rather thick. Ovary filling the calyx-tube, flat-topped or depressed in the centre, 4 celled with very thin dissepiments and many ovules in each cell ; style filiform, with a small capitate stigma. Capsule nearly globular, surrounded at the base by the persistent calyx, bursting irregularly. Seeds numerous, cuneate, angular ; testa thick. A shrub or small tree, leaves opposite. Flowers in loose racemes forming leafy panicles. *Benth. Fl. Aust.* iii. *p.* 300. Alcanna, *Gærtn.*

The genus is limited to a single species.

1. LAWSONIA ALBA, *Lam.*—A glabrous much-branched shrub or small tree, with divaricate branches, the smaller ones often spinescent. Leaves from obovate and obtuse to ovate or lanceolate and acute, narrowed into a short petiole rarely above 1 inch long, thin and penniveined. Flowers white, numerous, in little loose racemes forming usually a large terminal pyramidal leafy panicle, the ultimate branches usually leafless, and the bracts very minute or none. Pedicels 1 to 2 lines long. Buds globular. Calyx-tube not 1 line diameter, the lobes spreading to a diameter of 3 lines. Petals not twice as long as the calyx-lobes. Capsule about 3 lines diameter. *Wight. Illust.* i. *t.* 87.

Widely dispersed over tropical and subtropical Africa and Asia and in North Australia, abundant in a cultivated state and much in use as a hedge plant. Roxburgh states that it is indigenous on the Coromandal Coast, but I cannot say that I ever saw it truly wild in this Presidency ; the flowers are deliciously fragrant ; the plant is well known by its Hindoostani and Persian names Mendee and Henna, the fresh leaves are beaten up into a paste with Catechu and used by native women to dye the nails and skin of a reddish orange color, the timber is tough.

Analysis of Genera, Pl. XIV, fig. 6.

1. A portion of a stem in leaf.
2. A flowering branch.
3. A fruiting branch (all life size.)
4. A flower bud.
5. A full flower, 2 petals removed.
6. Anthers, front and back view.
7. Calyx and style.
8. Ovary cut vertically.
9. The same cut transversely.
10. Fruit cut transversely.
11. A seed.
12. The same cut vertically.
13. The same cut transversely.
14. Embryo

LAGERSTRÆMIA. LINN.

For Gen. Char. see letter-press to Pl. xxix.

1. LAGERSTRÆMIA REGINÆ, *Roxb.*—For description, &c. see Pl. xxix.

2. LAGERSTRÆMIA MICROCARPA, *Wight.*—For description, &c. see Pl. xxx.

3. LAGERSTRÆMIA PARVIFLORA, *Roxb* —For description, &c. see Pl. xxxi.

4. LAGERSTRÆMIA LANCEOLATA, *Wall.*—For description, &c. see Pl. xxxii.

SONNERATIA. LINN.

Gen. Char.—Calyx thick, the tube broadly campanulate, adnate to the ovary at the base, lobes 4 to 8, lanceolate or triangular, the sinuses acute without accessory lobes or teeth. Petals 4 to 8, narrow or none. Stamens numerous, inserted at the top of the calyx-tube, inflected in the bud. Ovary enclosed in and partially adnate to the calyx tube, depressed globular, 10 to 15 celled ; style elongated with a small capitate stigma. Fruit large depressed, fleshy, and indehiscent, surrounded by the persistent calyx, and adnate to it at the base. Seeds immersed in pulp, angular, with a thick testa. Embryo curved. Glabrous trees or shrubs. Leaves opposite, petiolate, rather thick. Flowers large, solitary or 3 together in the upper axils or at the ends of the branches. *Benth. Fl. Aust.* ii. p. 301. Aubletia, *Gærtn. Fruct.* 1, 379 *t.* 78. Chiratia, *Montrous.*

1. SONNERATIA ACIDA, *Linn. f.*—A tree. Leaves petiolate, broadly obovate or ovate, 2 to 3 inches long. Calyx broad, about 1 inch long divided to below the middle into about 6 thick valvate lobes. Petals linear, scarcely exceeding the calyx. Fruit above 1½ inches diameter. *Wight I. t.* 340 ;—*Rheed. Mal.* 3 *t.* 40.

Malabar, Travancore, Ceylon, sea coast and tidal backwaters widely spread in similar localities over the East Indies, the Archipelago, and in Eastern Africa and N. Australia,—in Ceylon it is called Gedde-killala, wood light and white and used for models, &c. and said to be a good substitute for coal in steamers, the surface roots used as a substitute for cork.

2. SONNERATIA APETALA is a Bengal species which does not I believe occur in the Peninsula.

Analysis of Genera, Pl. XV. fig. 1.

1. A flower before the stamens unroll.
2. The same cut vertically shewing the insertion of the stamens and the many celled ovary with the thin partitions.
3. A full flower.
4. A petal.
5. Anthers. (Drawn from fresh specimens.)

PUNICA. LINN.

Gen. Char. Calyx turbinate, 5, 7, cleft, æstivation valvular. Petals 5, 7. Stamens numerous filaments distinct. Style filiform. Stigma capitate. Fruit large, globose, crowned by the somewhat tubular limb of the calyx, baccate, indehiscent, covered with the tube of the calyx, divided horizontally into two parts by a dissepiment; the lower division 3 celled, the upper 5-9 celled; dissepiments membranaceous: placentæ in the lower division at the bottom; in the upper stretching from the side of the fruit to the middle. Seeds numerous, nestling in a pellucid pulp. Embryo oblong: radicle short, acute; cotyledons foliaceous, spirally convolute. A small tree or shrub with spinescent branchlets. Leaves deciduous, opposite, rarely verticillate or alternate, often axillary and fascicled, oblong, quite entire, not dotted. Flowers 2-3, nearly sessile on somewhat terminal branchlets, usually scarlet. *W. Prod. p.* 327.

1. PUNICA GRANATUM, *Linn.*—This is the well known pomegranate, cultivated in gardens throughout S. India, but introduced from the North, it is called Anar in Hindustanee. A decoction of bark of the root is a complete remedy for Tape-worm.

AXINANDRA, THW.

For Gen. Char. see letter-press to Pl. ccvii.

1. AXINANDRA ZEYLANICA, *Thw.*—For description, &c. see Pl. ccvii.

ORDER XLI—SAMYDACEÆ.

Sepals free or united at the base into a 4 or 5-lobed (rarely 2, 3 or 6, or more-lobed) calyx, free from the ovary or more or less adherent. Petals either as many as the sepals or calyx-lobes inserted at their base, persistent with them, and resembling them in consistence, or wanting. Stamens perigynous, indefinite or not corresponding in number with the calyx lobes, or, if equal to them, usually opposite the petals and alternating with small glands or scales. Ovary superior or more or less inferior, with 2, 3 or more parietal placentas and several ovules to each placenta; style entire or more or less divided into as many branches as placentas. Fruit indehiscent or opening in valves between the placentas. Seeds often arillate, with a fleshy albumen. Embryo straight or nearly so, with the radicle next the hilum and flat cotyledons. Trees or shrubs. Leaves alternate, undivided, usually toothed. Stipules small or none. Flowers hermaphrodite or rarely diœcious.

Not an order of much importance Casearia yields 4 trees but nothing is known of their timber. Osmelia 1 tree only known from Ceylon. Homalium 2 trees, one of which is abundant and yields excellent timber, the timber of the other is unknown.

Tribe I, Caseariæ.—Calyx free 4, 5 merous, petals 0. Stamens in a single series.

St. 6, 15, style simple, flowers fasciculate or corymbose ... ... CASEARIA.
St. 8-10, styles 2 or 3, flowers in slender racemes ... ... OSMELIA.

Tribe II, Homalieæ.—Calyx free or adnate to the ovary 4-15 merous, petals 4-15. Stamens inserted singly or in clusters opposite the petals.

Ovary more or less inferior ... ... HOMALIUM.

CASEARIA. LINN.

For Gen. Char. see letter-press to Pl. ccviii.

1. CASEARIA TOMENTOSA, *Roxb.*—A small tree, leaves coriaceous ovate to oblong often cordate at the base and sometimes obliquely sided, conspicuously serrate, not dotted, very velvetty on both sides when young, at length glabrous or subglabrous on the upper side except the costa, 3-5 inches long by 1½-2½ broad, petioles 2-4 lines long, stipules ovate small downy, flowers small pubescent greenish yellow in dense axillary clusters on pedicels 1-2 lines long, calyx segments oval or orbicular about 1 line long, stamens 8 or rarely only 6, fruit oblong ¾-1 inch long rather fleshy sulcated opening in 3 valves. *Roxb. Fl. Ind.* ii. 421.

This small tree is common throughout the presidency and in Ceylon, I am not aware that it is put to any use.

2. CASEARIA ESCULENTA, *Roxb.*—A small tree or sometimes only a large shrub, leaves subcoriaceous lanceolate bluntly acuminated, acute at the base generally more or less serrated sometimes entire or subentire, glabrous or with a slight pubescence about the costa and veins, punctate and lineolate when held up against the light, 5-7 inches long by 1½-2¼ broad, petioles 4-7 lines long, stipules small caducous, flowers small pubescent greenish yellow in rather dense axillary clusters on pedicels 1 line long, and just the same as in tomentosa. *Roxb. Fl. Ind.* ii. 422. Vareca Zeylanica, *Gærtn.* Casearia Zeylanica, *Thw. En. Pl. Zeyl. p.* 19. Casearia elliptica, *Willd*;—*Wight's Icones* 1849.

This is equally common with the last species, from which it only differs in the shape of the leaves and in their being more glabrous, punctate, and less serrated, it is generally only a shrub.

3. Caseria varians, *Thw.*—For description, &c. see Pl. ccviii.

4. Casearia Wynadensis, *Bedd.*—A small graceful tree, young parts densely aureo or rufo villous, branches softly pubescent, stipules small linear deciduous, leaves membranaceous penniveined, pellucidly punctate and lineolate, lanceolate with a long acumination at the apex or sometimes only acute or obtusely rounded, rather sharply serrated except near the base, at length glabrous above except the costa softly pubescent beneath especially on the costa and main veins, 4-6½ inches long by 1½-2 broad, petioles softly pubescent 4-6 lines long, flowers small 6-8 fascicled in the axils, pedicels 2-3 lines long pubescent, calyx pubescent on the outside very slightly hairy within, ciliate punctate, lobes 5 rounded, stamens generally 8 rarely 6, staminodes very hairy, ovary oblong attenuated into a style equalling the stamens, both hairy, stigma 2-4 lobed, placentas 2-4. *Bedd. Icones Pl. Indiæ Or. tab.* clix.

A pretty little tree not uncommon on the ghats in Malabar, Travancore, Tinnevelly &c. at 2000-3000 feet elevation.

OSMELIA. Thw.

For Gen. Char. see letter-press to Pl. ccix.

1. Osmelia Gardneri, *Thw.*—For description, &c. see Pl. ccix.

HOMALIUM. Jacq.

For Gen. Char. see letter press to Pl. ccx.

1. Homalium Ceylanicum, *Gard.*—For description, &c. see Pl. ccx.

2. Homalium Travancoricum, *Bedd.*—For description, &c. see Pl. ccxi.

ORDER XLII.—DATISCEÆ.

Flowers diœcious, rarely hermathrodite or polygamous. In the male the calyx tube very short or hemispherical, lobes 3-9 short equal or unequal, petals 0 or 8 small, stamens 4-25 opposite the lobes of the calyx, filaments short or elongate, anthers 2 celled dehiscing laterally or towards the inside ; ovary rudimentary small or none. In the female or hermathrodite calyx tubular adnate to the ovary lobes 3-8 short, stamens none or if present as in the male, ovary 1-celled open or shut at the apex, placentas parietal alternate with the calyx lobes, styles as many as the placentas and alternate with them simple or 2-parted stigmatose on the inside or with terminal capitate stigmas, ovules very numerous in 2-many series, anatropal ascending or sub-horizontal. Capsule membranaceous or coriaceous dehiscent many seeded. Seed minute, testa striated or impresso punctate, umbilicus strophiolate, albumen scanty ; embryo cylindric in the axis of the albumen, radicle elongate near the hilum. Trees or herbs pubescent, scurfy or glabrous, leaves alternate simple or pinnate, stipules none, flowers small or middle size in spikes or racemes.

An order only represented in South India by one tree, in Northen India the genus Datisca yields a second.

TETRAMELES. R. Br.

For Gen. Char. see letter press to Pl. ccxii.

1. Tetrameles nudiflora, *R. Br.*—For description, &c. see Pl. ccxii.

ORDER XLIII—ARALIACEÆ.

Calyx-tube adnate to the ovary ; limb forming a slightly raised line or short cup round the summit, truncate or toothed, or quite inconspicuous. Petals 5 or more, or rarely 4 usually valvate and shortly inflected at the tip, and often cohering rarely with a long inflected point, or obtuse and imbricate, inserted round an epigynous entire disk. Stamens as many as petals or sometimes more, inserted with them round the epigynous disk ; anthers versatile, with parallel cells opening longitudinally. Ovary inferior, 2 or more celled, or very rarely 1 celled by abortion, with 1 anatropous ovule in each cell, pendulous from the summit. Styles as many as cells, either distinct erect and afterwards recurved with small terminal stigmas, or united in a cone, or reduced to a slight protuberance with as many stigmas as cells radiating on the summit and often scarcely conspicuous. Fruit more or less drupaceous and indehiscent, the epicarp succulent rarely nearly dry and thin, always distinct from the endocarp, which is hardened into as many one seeded pyrenes as cells of the ovary, usually laterally compressed. Seed pendulous, testa very thin, albumen the shape of the pyrene, with an even surface, or rarely ruminate. Embryo minute, near the apex of the seed, the radicle superior. Trees, shrubs, or woody climbers, very rarely herbs. Leaves simple, digitate or pinnately compound sometimes very large, the rachis often articulate, the petiole dilated at the base or the dilatations united in an intrapetiolar stipule. Flowers small, often greenish or purple, in umbels heads or rarely racemes, which are usually disposed in large terminal racemes or panicles, the umbels rarely solitary or in compound umbels. Bracts usually small

and often inconspicuous or none. Flowers frequently polygamous, the ovary entirely abortive in the males, the stamens often smaller or rarely wanting in the females.

* Petals more or less imbricate.	
Style free.	ARALIA.
Styles connate into a column	PENTAPANAX.
* Petals valvate.	
Leave, pinnate	POLYSCIAS.
Leaves digitate	HEPTAPLEURUM.

Not an order of much importance to the forester. Heptapleurum yields several large trees very common in our western forests, but their timber is I believe of no value. Polyscias is represented by 1 middling sized tree, and Pentapanax and Aralia each yield one small tree.

The genera Tupidanthus, Brassiopsis, Macropanax, and Helwingia are represented by shrubs or small trees in Northern India, but do not occur in the Peninsula. Fatsia is common in a cultivated state on the Nilgiris.

ARALIA. LINN.

Gen. Char. Flowers sometimes polygamous, calyx with the margin prominent distinctly 5 toothed, petals 5 ovate acute or obtuse, margins more or less imbricate opening separately or cohering and falling off in a lid or calyptra, stamens 5, anthers oblong or ovate, disk nearly flat or rarely conical, ovary 2-5 celled, styles as many as the ovary cells at first erect at length recurved, berry angulate or ribbed 2-5 celled. Trees, shrubs or herbs sometimes aculeate or setose, leaves alternate decompound usually twice or thrice pinnate, very rarely digitate, leaflets serrate, flowers variously umbelled, pedicels articulated below the flower. Panax. Section. 1. *DC. Prod*, iv. *p.* 252. Aureliana, *Lafit.* Aralia, *DC. Prod.* iv. 257. *Ex parte.* Dimorphanthus, *Miq. Comm. Phytogr.* 95 *t.* 22.

1. ARALIA MALABARICA, *Bedd.*—A small tree or large shrub, the whole plant more or less aculeate and setose particularly the young parts, leaves 2-3 feet long bipinnate with a pair of leaflets on the common petiole at the base of each opposite pair of pinnæ, pinnæ several pair, with 2-4 pair of leaflets on each and 1 terminal one, leaflets sessile or very shortly petiolate often oblique at the base ovate cordate to lanceolate terminating in a long fine acumen, simply or doubly serrate, 3 5½ inches long, 1-1¾ inches broad, aculeate and densely setose when young (as is the petiole) but more glabrous in age, the umbels pedunculate on the branches of a large spreading panicle, flowers about 20 in a head on pedicels about ½ an inch long, bracts and bracteoles prominent and persistent, fruit slightly 10 ribbed.

This small tree is confined to our Western mountains, where I have found it in various parts from Malabar down to S. Travancore, it is common on the Carcoor ghat in Wynad.

Analysis of Genera, Pl. XV, fig. 2.

1. A portion of a very young pinnæ shewing the aculeate and setose petiole and leaflets.
2. Portion of a leaflet (life size) shewing venation serratures and scattered hairs.
3. An umbel of flowers after dehiscence of the petals.
4. An umbel (much magnified) most of the pedicels and flowers removed and shewing the ciliate bracteoles.
5. A flower bud (highly) magnified, petals slightly imbricate at the sides.
6. A flower, petals opening separately and slightly imbricate at the sides.
7. A petal inside view shewing the central rib.
8. A flower from which the petals have just dehisced as a calyptra.
9. Petals (joined into a calyptra) just after dehiscence.
10. Anthers, front and back view.
11. Young fruit and reflexed styles.
12. Same cut vertically.
13. The same cut transversely.

PENTAPANAX. SEEM.

Gen. Char. Margin of the calyx 5-toothed, petals 5 slightly imbricate at the sides, opening separately or falling off in a calyptra, stamens 5, anthers ovato-oblong, disk convex conical in the middle and rising into the column of styles, ovary 5 celled, styles 5 connate very short or produced into a column, stigmas terminal, fruit subglobose or globose not angled, the exocarp fleshy, pyrenes 5 crustaceous. Trees or shrubs often epiphytic and subscandent, leaves 3-foliate or pinnate serrate or entire, flowers umbelled. *Seem. Journ. of Bot.* ii. 294. Hedera, *Wight. Icones.* 307.

1. PENTAPANAX LESCHENAULTII, *DC.*—A shrub or small tree often epiphytic, unarmed glabrous, leaves 6 inches to 2 feet long trifoliate or unequally pinnate with 2 pair of leaflets, leaflets ovate often unequal at the base with a prominent acumination, sharply and closely serrate the serratures often glandular, submembranaceous, beautifully reticulated, 4-5 inches long by 2-2½ broad, petioles ¼-½ inch long, (or 1-2½ inches in the terminal leaflet) panicle corymbiform, bractes deciduous, flowers umbellate very numerous, on pedicels about ½ an inch long, petals slightly imbricate combined and falling off in a calyptra, disk 5 angled convex, berry globose not angled or ribbed. Panax Leschenaultii, *DC. Prod.* iv. 254. Hedera Leschenaultii et trifoliata, *WA. Prod. p.* 377;—*Wight's Icones tab.* 307.

Common on the higher ranges of the Nilgiris and other mountains on the Western side of this Presidency often epiphytic in the fork of large trees.

Analysis of Genera, Pl. XV, fig. 3.

1-2. Portions of a leaflet (life size) showing the venation and serratures.
3. A flower bud, calyx 5-toothed, petals slightly imbricate.
4. A flower just after the dehiscence of the petals showing the anthers, 5 angled disk at the apex of the ovary, and the styles combined into a column.
5. The petals just after dehiscence combined in a calyptra.
6. Anthers front and back view.
7. The column of styles 5 joined into 1 with 5 apical stigmas.
8. An umbel of flowers just after the dehiscence of the petals.
9. An umbel of flower buds.
10. Fruit cut transversely.

POLYSCIAS. Forst.

For Gen. Char. see letter press to Pl. ccxiii.

1. Polyscias acuminata, *Wight.*—For description &c. see Pl. ccxiii.

HEPTAPLEURUM. Gærtn.

For Gen. Char. see letter press to Pl. ccxiv.

1. Heptapleurum racemosum, *Wight.*—For description &c. see Pl. ccxiv.

2. Heptapleurum rostratum, *Wight.*—A very large tree, glabrous except the scurfy inflorescence, leaves digitate, leaflets 5-9 ovate-lanceolate to elliptic, distantly serrated, acute or acuminated at the apex, 5-7 inches long by 1¾ to 2¼ broad, stipules adnate to the petiole at the base only united within it into a single lamina which is obtuse and emarginate or sometimes mucronate, petiolule 1-2 inches long, umbels in a much branched terminal scurfy panicle, bractes sheathing and conspicuous, lateral branches with from 1 to 6 umbels, flowers numerous on pedicels 4 lines long parts of the flowers usually 5-rarely 6-7, united styles short forming a beak. *Wight. Icones. tab.* 1,013.

Nilgiris and Anamallays at 5-6000 feet elevation.

3. Heptapleurum obovatum, *Wight.*—A middling sized or small tree, glabrous in all its parts, leaves digitate, leaflets 5-6 or rarely 7 obovate broadly oval or nearly orbicular 2-4 inches long, on petiolules 1-2 inches long, panicles numerous aggregated at the ends of the branches ebracteolate, umbels solitary on the lateral peduncles, flowers 3-20 in each umbel on pedicels about 4 lines long, parts of the flower 6-8, petals often deciduous in a combined lid or calyptra. *Wight. Icones. tab.* 1011.

A common tree in all our western ghat forests from 2000 to 6000 feet elevation, it differs much in the shape of the leaflets and number of flowers in the umbels, in specimens from the Anamallays the leaflets are almost orbicular and the flowers 3-7 only in each umbel.

4. Heptapleurum venulosum, *WA.*—A small tree, glabrous in all its parts, leaves digitate, leaflets 5-7 elliptic or oval oblong, sometimes broader at the apex obtuse or with a sudden acumination, coriaceous, shining above, 3-8 inches long by 1½-2½ broad, on petiolules 1-2 inches long, venation very prominent. Stipules adnate to the petiole at the base only united within it into a single obtuse lamina, panicles crowded at the ends of the branches shorter than the leaves, umbels solitary on the lateral peduncles 6 20 flowered, bracteoles at the base of the peduncles, gradually acuminated from a broad base, chaffy deciduous, flowers often unisexual the males with exserted stamens and scarcely any rudiment of an ovary, females often with more or less perfect stamens, parts of the flowers 5-6 Paratropia venulosa, *WA. Prod. p.* 377 ;—*Wight's Ill. tab.* 118. Aralia digitata, *Roxb. Fl. Ind.* ii. 107.

A small tree, sometimes subscandent; common on both sides of the presidency and in Bengal, also found in Australia.

5. Heptapleurum Wallichianum, *WA.*—Somewhat arboreous, glabrous, leaves digitate, leaflets 8-10, long petioled, oblong pointed quite entire coriaceous, veins not prominent, panicles numerous at the ends of the branches, bracteoles caducous, flowers pedicelled and umbelled numerous, parts of the flower 6. *WA. Prod. p.* 377.

Courtallum (I have no specimens of this tree).

6. Heptapleurum exalta, *Thw.*—A large tree, glabrous, leaflets 7-9 coriaceous glabrous entire oblong rounded at the base or subcordate, venation not prominent 5-10 inches long by 2¼-4 inches broad, petiolules ½-2½ inches long, umbels 10-15 flowered rather long pedunculate, racemose, parts of the flower 8-9. *Thw. En. Pl. Zey. p.* 132.

Ceylon 4000-6000 feet.

7. Heptapleurum capitatum, *WA.*—Arboreous? leaves digitate, leaflets 6-9 long petioled oblong suddenly and shortly acuminate retuse at the base quite entire somewhat coriaceous without prominent veins, furfuraceous when young particularly on the midrib, petiole furfuraceous, panicle elongate with a concave persistent bractea at the base of the elongated peduncles, flowers sessile numerous capitate, parts of the flower 6-9. *WA. Prod. p.* 376.

Tinnevelly and Travancore mountains (I have no specimens of this tree.)

8. HEPTAPLEURUM TEREBINTHACEA, *Vahl.* and 9. HEPTAPLEURUM EMARGINATUM, *Moore*, are scandent and epiphytic shrubs occurring only in Ceylon, and I have an undescribed epiphytic species from the Tinnevelly hills with very small leaflets but it is not in flower. From the Western slopes of the Nilgiris I also have what I believe to be an undescribed species a large tree, but my specimens are not perfect enough for description, it has axillary panicles with the lateral branches many umbelled, leaflets 5 elliptic entire terminating in a long very gradual acumination, venation not prominent.

ORDER XLIV—CORNACEÆ.

Flowers hermaphrodite or unisexual regular, calyx tube adnate to the ovary, limb obsolete, or forming a raised border, entire or with as many teeth as petals, æstivation open or valvate, petals 4-5 rarely more or none, or valvate or imbricate inserted round the epigynous disk or on the calyx border, stamens inserted with the petals and as many or twice or four times as many, filaments short or elongate, filiform subulate or flat, anthers fixed by the base or at the back with parallel cells opening longitudinally, disk epigynous, angulate crenate or lobed rarely annular or shortly tubulose, ovary inferior 1-4 celled, style short or elongate, stigma capitate truncate entire or lobed, ovule solitary very rarely 2 in the cells pendulous anatropous, raphe lateral or dorsal, fruit an indehiscent drupe with a 1-4 celled putamen rarely with 2 bony or crustaceous pyrenes, seed oblong pendulous, testa membranaceous or slightly coriaceous, albumen copious fleshy, embryo straight small or large, the radicle superior and shorter than the flat cotyledons.

Trees or shrubs glabrous or sericeo-pilose, leaves opposite or alternate entire or slightly lobed, stipules none, flowers in terminal or axillary cymes or fasciculate in the axils.

This order is only represented by 2 genera in Southern India. Alangium and Mastixia, the former is common throughout the presidency, the latter is confined to the western ghats.

Marlea, Cornus, Aucuba, Nyssa and Toricellia are Himalayan genera yielding shrubs or small trees, but they do not occur in the Peninsula.

ALANGIUM. LAM.

For Gen. Char. see letter press to Pl. ccxv.

1. ALANGIUM LAMARCKII, *Thw.*—For description, &c. see Pl. ccxv.

2. ALANGIUM GLANDULOSUM, *Thw.*—Is a small subscandent tree found in Ceylon and described by Dr. Thwaites in his En. Pl. Zey. p. 133, it is allied to the last very protean species, but is distinguished by its much smaller flowers and fruit, by the deep red glandular furfurescence, on the young shoots and inflorescence, and its glandular petals.

MASTIXIA. BL.

For Gen. Char. see letter press to Pl. ccxvi.

1. MASTIXIA ARBOREA, *Wight.*—For description, &c. see Pl. ccxvi.

ORDER XLV—CAPRIFOLIACEÆ.

Calyx-tube adnate to the ovary, the limb short, truncate or of 4 or 5 rarely more lobes or teeth. Corolla gamopetalous, inserted round the epigynous disk ; lobes 4 or 5 rarely 3, imbricate in the bud. Stamens as many as lobes of the corolla, alternate with them, inserted in the tube ; anthers versatile with parallel cells opening longitudinally. Ovary inferior, 2 to 5-celled or rarely 1-celled, with 1 or more pendulous ovules in each cell. Stigmas as many as cells, or united into one, sessile or on a single filiform style. Fruit an indehiscent berry, or rarely dry, 1 to 5-celled. Seeds 1 or more in each cell. Embryo in the axis of a fleshy albumen ; radicle superior, cotyledons oval or oblong. Trees, shrubs, or climbers, rarely herbs. Leaves opposite, usually without stipules, simple or rarely pinnate.

A small order nearly allied to Rubiaceæ, of no importance to the forester. Viburnum yields 3 small trees common on our Western mountains, Lonicera one shrub common on the Nilgiris, and Dichilanthe one good sized tree peculiar to Ceylon. Leycesteria and Abelia are Himalayan genera each yielding a shrub but they are not represented in the Peninsula. The only other representative of the order in S. India is the Nilgiri honeysuckle (Lonicera Leschenaultii) a climber, besides the honey-suckles, the Elder (Sambucus) the Lauristinus and the Gelder-rose belong to the order, the 2 latter being species of Viburnum.

Tribe Lonicereæ.—Corol-tube elongate, style filiform, raphe extrorse.

Ovary 2-3 celled, ovules many pendulous	LONICERA.
Ovary 2-celled, ovules solitary pendulous	DICHILANTHE.

Tribe Sambuceæ.—Corol rotate or shortly tubular, stigmas 3 sessile, raphe introse or lateral.

Leaves simple	VIBURNUM.

LONICERA. DESF.

Gen. Char. Calyx-limb 5-toothed, corol with a more or less elongated tube and an oblique limb either 5-lobed or in 2 lips, the upper one 4-lobed, the lower entire. Stamens 5, ovary 2 3 celled with several pendulous ovules in each cell, style filiform with a

capitate stigma, berry small fleshy few or many seeded, 2-3 celled or 1 celled from the obliteration of the partitions. Erect shrubs or climbers, leaves opposite entire, flowers 2 or more together sessile in axillary or terminal heads.

1. LONICERA LIGUSTRINA, *Wall.*—A shrub or very small tree 10-15 feet, bushy, young branches pubescent, leaves lanceolate or ovate-lanceolate acute shortly petioled, quite entire shining, sprinkled on the margin and whilst young on the midrib beneath with spreading hairs, 1-3 inches long, peduncles 2-3 lines long, pubescent slightly drooping at the apex axillary and solitary 2-or rarely 3-flowered, a setaceous subulate bract at the back of each ovary, and a cup-shaped bracteole closely surrounding and retaining both ovaries, or when there are 3 flowers all 3 ovaries, calyx limb constricted in the middle, the margin 5-toothed, teeth oblong short, corol puberulous or glabrous, the tube slender, gibbous above the base ¼-½ an inch long, ovaries 3-celled, cells 1-2 ovuled, berries globose distinct covered by the bracteole, seeds 2-4 large. *Wall*;—*Roxb. Fl. Ind.* (*ed Wall.*) ii. 179;—*WA. Prod. p.* 389;—*Wight. Ill. tab.* 121; *Icones tab.* 1025.

Very common on the Nilgiris and much in use as a hedge plant: also found on the Himalayas.

Analysis of Genera. Pl. XV, fig. 5.

1. A portion of a branch in flower (life size.)
2. A two flowered peduncle.
3. A peduncle with 3 flowers.
4. A flower opened to show the stamens.
5, 6, 7. Anther, front, back and side view.
8. Ovaries just after the fall of the flower.
9. The same cut vertically showing the pendulous ovules.
10. The same cut transversely showing 3 one-two ovuled cells in each.

DICHILANTHE. Thw.

Gen. Char. Limb of the calyx shortly tubular within 5-scaled, 5-parted, corol infundibuliform curved, mouth bilabiate, upper lip 2 toothed, lower 3 toothed, stamens 5 ovary 2 celled, ovules solitary pendulous. A tree branches terete, leaves lanceolate coriaceous entire, flowers terminal sessile crowded. *Thw. in Hook. Kew. Journ. of Bot.* viii. *p.* 270-376.

1. DICHILANTHE ZEYLANICA, *Thw.*—A tree, 30-40 feet high, leaves 3-7 inches long by 1½-2½ inches broad.

Ceylon, in forests between Galle and Ratnapoora at 1000 feet elevation.

Analysis of Genera, Pl. XV, fig. 4.

1. A flower.
2. The corol opened out.
3. An anther.
4. Stigma.
5. Ovary cut vertically.
6. The same cut transversely.
7. An ovule. (From Dr. Thwaites's drawing all magnified.)

VIBURNUM. L.

For Gen. Char. see letter-press to Pl. ccxvii.

1. VIBURNUM PUNCTATUM, *Ham.*—For description, &c. see Pl. ccxvii.

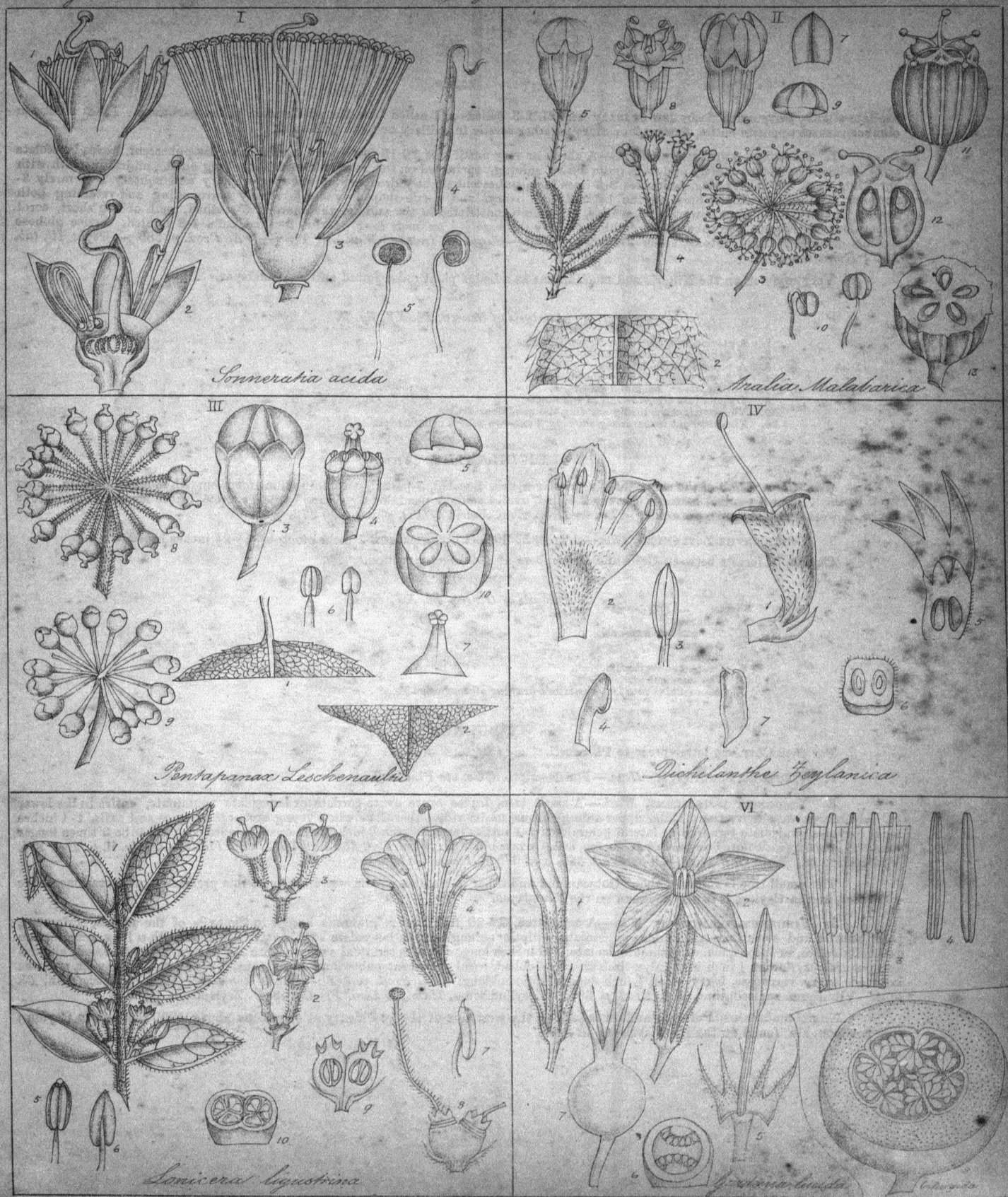
2. VIBURNUM ERUBESCENS, *Wall.*—A small tree, leaves ovate ovato-cordate or lanceolate acuminate, entire in the lower half, dentato-serrate above the middle, upper side glabrous, under side puberulous when young except the nerves and axils, 1-4 inches long, corymbs paniculate terminal or lateral pendulous, 1-4 inches long, flowers ½ inch long, ovary glabrous, corol-tube 3 times longer than the lobes cream colored or pale pink, berry small ovate-oblong. *Wall. Cat.* 459 *and* 7474, *and Plant. As. Rar.* ii. *p.* 29 *t.* 134. V. Wightianum, *Wall. Cat.* 3729;—*WA. Prod.* 388, *and Wight Icones t.* 1024.

This small tree is common about Ootacamund and other mountains on the western side of this presidency, at elevations above 4000 feet, and in Ceylon, it is also common on the Himalayas.

3. VIBURNUM HEBANTHUM, *WA.*—A small tree, 15-20 feet, leaves glabrous except in the axils of the nerves, coriaceous, paler beneath and sometimes glanduloso-punctulate, elliptic oblong, oblong-lanceolate or obovate, acute or with a long acumination generally entire, or inconspicuously sinuato-dentate, 2-6 inches long, corymbs terminal subumbellate 3-6 partite, many flowered, glanduloso-puberulous, flowers ¼ inch long-calyx-limb shortly 5-lobed, corol pubescent puberulous or glabrous, lobes short obtuse erect, stamens exserted, ovary verrucose, berry small ¼ inch long elliptico-oblong. *WA. Prod. p.* 388;—*Wight Icones tab.* 1023. V. coriaceum, *Bl. Bijd.* Viburnum capitellatum, *WA. Prod. p.* 388. V. cylindricum, *Ham. in Don. Prod.* 142. V. Zeylanicum, *Gard.*

Nilgiri mountains, Pulneys, and other hills on the west side of the presidency at elevations above 5000 feet and in Ceylon; very common, also found on the Himalayas and in Java.

Lythraria. *Araliacea.* *Caprifoliacea.* *Rubiacea.*



VIBURNUM PUNCTATUM. (Nat. order Caprifoliaceæ.)

VIBURNUM. *Linn*.—GEN CHAR Calyx with a border of 5 small teeth, corol rotate or shortly tubular regular. Stamens 5, ovary 1-celled or very rarely 2-3 celled with 1 pendulous ovule in each. Stigmas 3 or rarely 2 sessile, berry 1-seeded. Small trees or erect shrubs, leaves entire or palmately lobed, flowers in terminal cymes or panicles.

VIBURNUM PUNCTATUM. (Ham.) A middling sized or small tree, young branches, petioles, and peduncles dotted with small rusty-colored scales, leaves coriaceous elliptic or elliptico-lanceolate acuminate, quite entire, the margin slightly recurved, glabrous, above shining, beneath covered with minute rusty-colored dots or in age only puncteolate, 4-4½ inches long by 1½-2 broad, petioles about ½ inch long, corymbs terminal large trichotomous, subumbellate, the branches angled, calyx scale-dotted, corol rotate or scarcely campanulate dotted with scales, berry oval-oblong ⅓ inch long compressed, endocarp bi-sulcate on both sides. *Ham. in Don. Prod.* 142. V. acuminatum, *Wall.*;—*WA. Prod. p.* 386.

This small tree is very common in many of our subalpine and alpine jungles from no great elevation up to 6000 feet; it is also found on the Himalayas and in Java.

Analysis.

1. Under surface of a leaf, showing the dot like scales.
2. A flower bud.
3. A full flower, showing calyx and corol dotted with scales
4. Corol removed and opened out, showing the 5 stamens.
5. The ovary and the 3 sessile stigmas.
6. Anthers, front and back view.
7. Ovary cut vertically, showing its single cell and solitary pendulous ovule.
8. Bunch of fruit. (Drawn from fresh specimens)

Covindo del. Dumphry Lith.

Viburnum punctatum (Ham.)

HERITIERA PAPILIO. (Nat. order Sterculiaceæ.)

HERITIERA. *Ait.*—GEN. CHAR. Monœcious, calyx 4-6 toothed or cleft, petals 0. *Male*: staminal column slender bearing 4-6, 2-celled anthers in a ring just below the apex of the column regularly arranged in a single series, cells parallel. *Female*: ovaries 56 distinct but connivent, ovules 12 from the ventral suture near the base or at or above the middle, when 2 collateral or superposed, style short recurved a pair of very minute staminodes on a single filament between each ovary at the base, or staminodes absent, ripe carpels woody or fibrous 1 seeded indehiscent keeled along the back or extending into a long membranaceous and fibrous wing. Seed exalbuminous, cotyledons thick, radicle next the hilum.

Trees with entire simple leaves, silvery lepidote underneath, venation penniveined or sub-3-nerved at the base, flowers small in axillary dichotomous panicles.—Bolanopteris, *Gærtn. Fruct.* ii. 94. *t.* 98-99.

HERITIERA PAPILIO. (Bedd.) A very lofty evergreen tree, monœcious, all the young parts, panicles, and inflorescence clothed with a golden soft stellate tomentum, trunk erect of great height, leaves 3 nerved at the base, veins pinnate above. lanceolate rather acute at the apex, 4-5 inches long by 1¼-2 broad, when young densely covered on the upper side with fugacious close set scales, at length quite glabrous and shining above, beneath permanently silvery with close set scales (as in Cullenia), petioles 8-10 lines long, panicles axillary much shorter than the leaves, compound branches di-trichotomous densely covered with scaly tomentum as is the calyx, flowers cream-colored, bractes small and very early caducous, calyx campanulate, in the male flower 4-5 cleft to nearly the middle about 2 lines long, staminal column slender glabrous, anthers 4-5, in the female, calyx 5-6 cleft, ovaries 5-6 distinct sparingly covered when young with stellate scales soon quite glabrous, 2-ovuled, a pair of minute sterile stamens on a single filament not ½ a line long are present between the base of each ovary, styles recurved, carpels 1 seeded, samaroid produced into a large sub-deltoid membranaceous wing shaped like the outer wing of some butterflies, very fibrous with numerous nerves, the lamina soon separating and exposing the fibres.

An immense tree common in the dense moist forests above Courtallum (Tinnevelly) at about 3000 *feet elevation, also about Peermede (Travancore)* 3500 *feet, in flower in August and September, it has only recently been discovered, and should be added to the Manual at page* xxxiii ; *it yields a very valuable tough timber.*

Analysis.

1-2. Pentamerous female flowers.
3. The same open, showing the 5 ovaries with a pair of minute staminodes between each at the base.
4. Staminodes.
5. An ovary.
6. The same cut vertically, showing 2 superposed ovules.
7-8-9. Young fruit.
10. 5-merous male flowers.
11. The same opened, showing the column of stamens.
12. A 4-merous male flower, the st column with 4 anthers.
13. A column of stamens from a 5-merous flower, showing 5 anthers.
14-15 Anthers.
16. Ripe fruit (life size.)
17. A portion of the wing, showing the lamina separating and exposing the fibres. (Drawn from fresh specimens.)

Covundo del.

Heritiera Papilio. (Bedd.)

HYMENODYCTION OBOVATUM. (Nat. order Rubiaceæ.)

HYMENODYCTION. *Wall.*—GEN. CHAR. Calyx tube ovate, border 5-toothed, corol-tube infundibuliform short or elongate the limb 5 lobed, lobes valvate in the bud, anthers exserted or included, the filaments inserted on to the corol near its base quite free or monadelphous in a tube at the base, style filiform much exserted, stigma clavate capitate, ovary 2-celled, ovules numerous attached to a large fleshy placenta which is aduate along the whole length of the axis but is easily separable and at length becomes free, capsule 2-celled 2-valved loculicidal, seeds flat imbricate surrounded by a reticulated wing which is bifid at the base, embryo thick in fleshy albumen, cotyledons cordate, radicle oval. Trees, leaves entire long petioled, stipules large glandularly serrate, panicles terminal furnished with 1 or more large white or cream colored floral leaves, flowers small fragrant. *Wall. in Roxb. Fl. Ind. ed. Cary. vol.* ii. *p.* 148. Cinchona, *Roxb. Fl. Ind.* 1. *p.* 529.

HYMENODYCTION OBOVATUM. (Wall.) A large tree, leaves crowded at the apex of the branches generally obovate with a narrow sudden acumination, some of the upper ones oblong or ovate, glabrous on both sides except the axils of the nerves beneath, about 4 inches long by 2¼-2½ broad, pinnate veins rather prominent, veinlets beautifully reticulated beneath, petioles 1½ to 2 inches long, stipules ovate or oblong gland-serrated deciduous, racemes terminal erect pubescent several together generally simple, rarely with 1 or 2 branches, each generally furnished with only one floral leaf just below the flowers which is lanceolate convex and a little rugose above, pure white or cream colored beautifully veined and reticulated and slightly pubescent underneath, about 2 inches long, and on a shining petiole of the same length, sometimes this floral leaf is absent on one or more of the racemes, flowers small sessile or subsessile furnished with linear subulate bracts at their base, calyx very hairy: corol slightly hoary, tube short, limb subcampanulate with the lobes lanceolate acute, stamens monadelphous in a tube which is adnate to the base of the corol but easily separable, ovary hairy. *Wall. l. c. p.* 153.

This beautiful tree is not uncommon in our subalpine forests from Canara down to South Travancore, up to elevations of 4000 *feet, it is less common however than the H. utile of Wight (which I take to be H. thyrsiflorum, Roxb.); it is also found in the Bombay Presidency, where it is called Karwai, (i. e., bitterness), in Tamil it is called Yella mala kai, its timber is used by the natives for a variety of purposes and is probably equal to that of H. excelsum, in the Madura district the tree is called Malday Tanàk.*

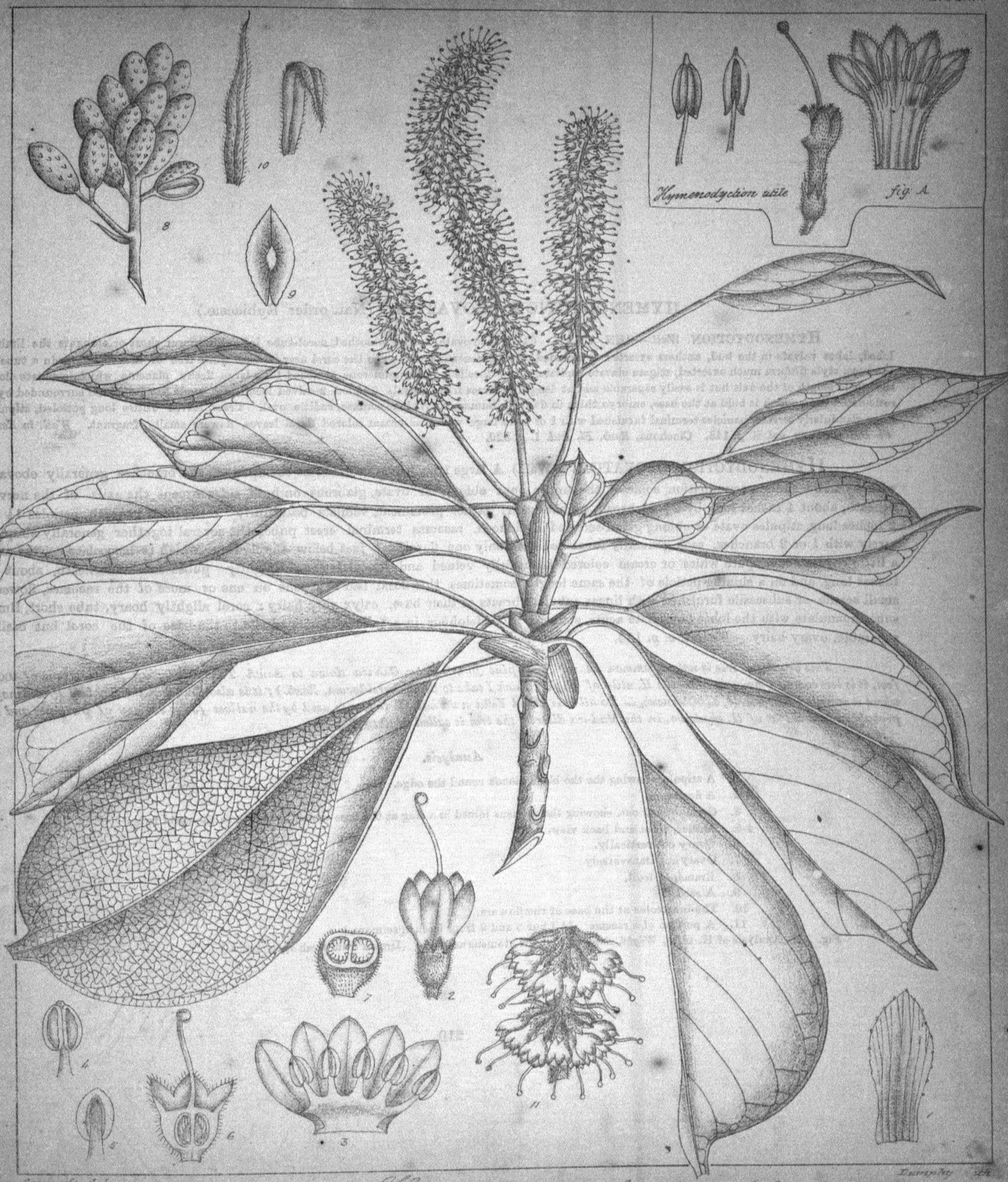
Analysis.

1. A stipule, showing the the black glands round the edge.
2. A flower.
3. Corol opened out, showing the stamens joined in a ring at the base which is adnate to the corol tube.

4-5. Anther, front and back view.

6. Ovary cut vertically.
7. Ovary cut transversely.
8. Branch of fruit.
9. A seed.
10. The bracteoles at the base of the flowers.
11. A portion of a raceme. (All but 8 and 9 from fresh specimens.)

Fig. *A*. Analysis of H. utile, *Wight*, showing that the stamens are free. (Drawn from fresh specimens.)



Gerrado del.

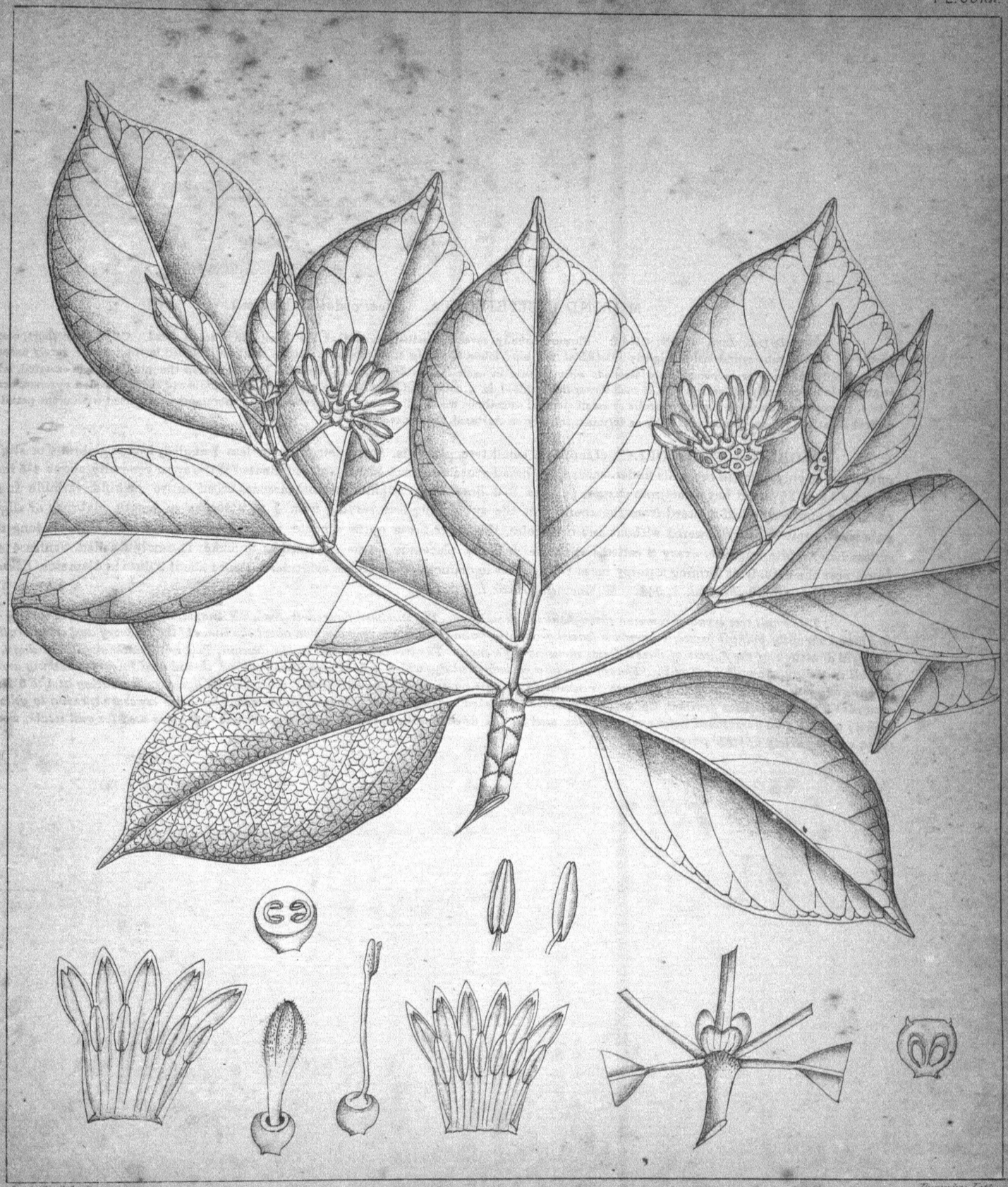
Hymenodyction obovatum, Wall.

MORINDA CITRIFOLIA. (Nat. order Rubiaceæ.)

MORINDA. *Linn.*—GEN. CHAR. Flowers usually several together, united at the base into a small head. Calyx limb short, scarcely toothed. Corolla tube cylindrical or slightly dilated at the top; lobes 5, rarely 4, valvate in the bud. Anthers included in the tube or rarely exserted. Ovary 2 celled or more or less completely 4-celled, with 1 ovule in each cell, laterally attached at the base or below the middle; style exserted, with 2 stigmatic lobes or rarely entire. Fruit of each flower-head united in a compound succulent berry, including a number of hard 1-seeded pyrenes, usually 2 to 4, proceeding from each flower. Shrubs or small trees, or sometimes woody climbers. Stipules usually membranous and united within the petioles in a short sheath. Flower heads on axillary or terminal solitary or clustered peduncles.

MORINDA CITRIFOLIA. (Linn.) A small tree glabrous, branchlets more or less 4 angled, leaves glabrous or slightly pubescent or only hairy in the axils underneath, from broad ovate to narrow lanceolate, acuminated at the apex generally about 4-5 inches long by 1¼ to 2¼ broad but sometimes larger, petioles 3-6 lines long, stipules membranaceous, broad entire or bifid, variable in size, peduncles apparently leaf opposed from the abortion of the subtending leaf varying from ¾ to 2 inches in length glabrous or slightly pubescent, capituli many flowered without any bracteoles, the calyx-tubes quite connate in the flower head, corol 5-8 lines long more or less hairy white fragrant, ovary 2 celled but the thick fleshy placentas are so extended as to make it nearly 4 celled, ovules 4 erect from near the base, fruit forming a pulpy mass 1-1¼ inches in diameter, the pyrenes orbicular flattened about 3 lines in diameter. *Linn.*;—*DC.* iv. 446 ;—*Roxb. Fl. Ind.* i. 541. M. tinctoria, *Roxb. l. c. p.* 543.

This small tree is rather common throughout the presidency. The specimen figured is from the Anamallay forests and is a variety with very broad abruptly pointed leaves, a narrower leaved gradually pointed variety is very common about the banks of the Cauvery and other localities; a careful dissection of the flowers of these 2 forms shows no difference. The tree is called 'Al in Hindustani, Togare, Togaree mogilli, Mulugu, and Maddi in Teligu, Noonah in Tamil. The roots yield a valuable red dye which is fixed with alum; the red thread used in carpet making and red turbans are generally dyed with it. The tree is cultivated in some parts of India and Birmah solely for its dye, the roots selling at 4 to 5 Rs. the maund. The wood is close grained, light, tough and easily worked, when fresh of a bright yellow color, but after exposure turning to yellowish brown; a cubic foot unseasoned weighs nearly 40 lbs. and 30 lbs. when seasoned, and its specific gravity is ·480; it is used for gun stocks, wooden shoes, and a variety of other purposes.



Morinda del. Dumpier, Lith.

Morinda citrifolia (Linn.)

CANTHIUM DIDYMUM. (Nat. ord. Rubiaceæ.)

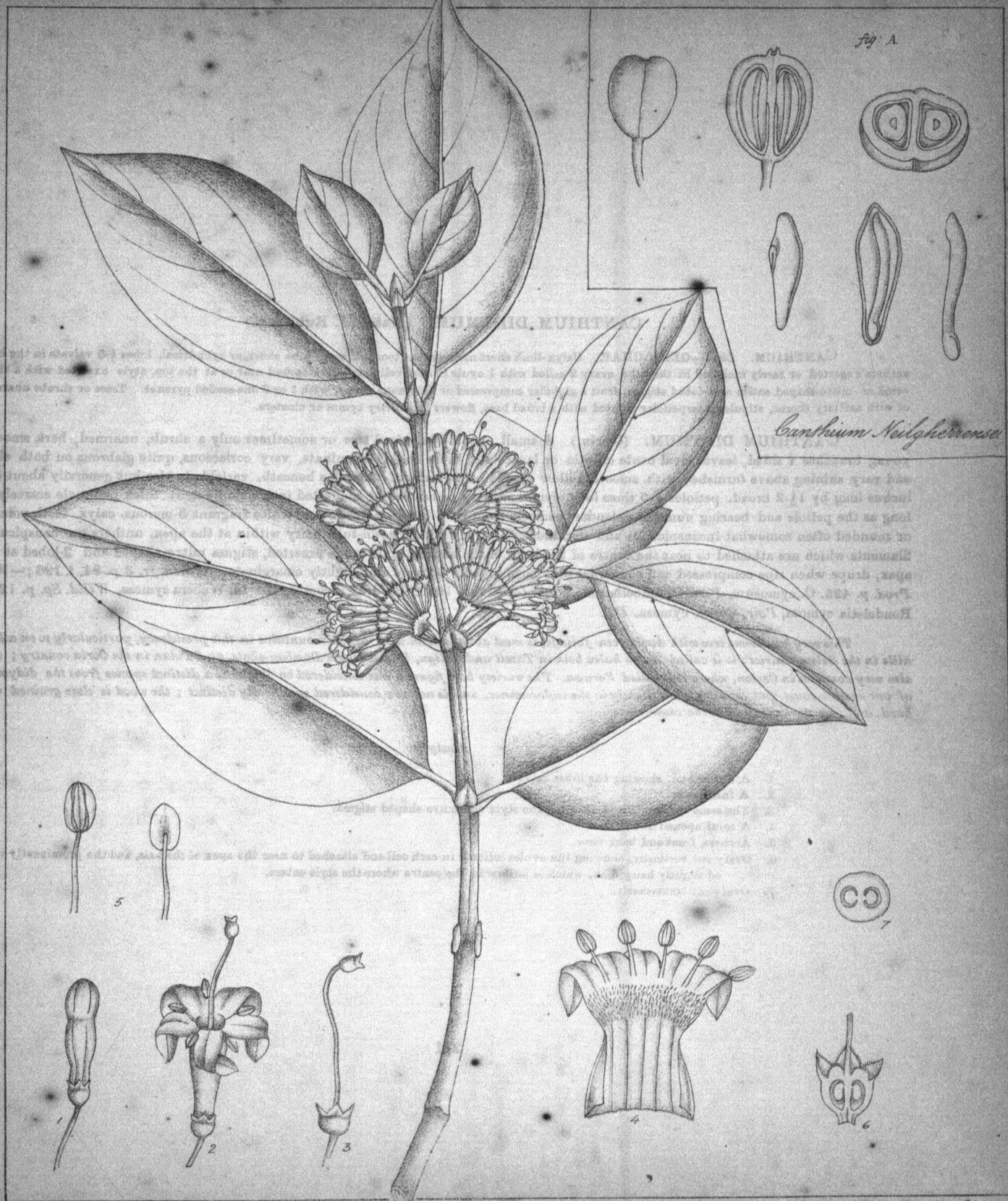
CANTHIUM. *Lam.*—GEN. CHAR. Calyx-limb short more or less toothed, corol-tube short or cylindrical, lobes 4-5 valvate in the bud, anthers exserted or rarely included in the tube, ovary 2 celled with 1 ovule in each cell laterally attached near or at the top, style exserted with a thick ovoid or mitre-shaped entire or 2-lobed stigma, fruit a globular compressed or didymous drupe, with 1 or 2 one-seeded pyrenes. Trees or shrubs unarmed or with axillary thorns, stipules interpetiolar pointed with a broad base, flowers in axillary cymes or clusters.

CANTHIUM DIDYMUM. (Gærtn.) A small or middling sized tree or sometimes only a shrub, unarmed, bark smooth, young branches 4 sided, leaves oval ovate elliptic or lanceolate, more or less acuminate, very coriaceous, quite glabrous on both sides and very shining above furnished with smooth hollow glands in the axils of the veins beneath, variable in size but generally about 3-5 inches long by 1½-2 broad, petioles 4-5 lines long, cymes axillary peduncled or congested into a single short thick peduncle scarcely as long as the petiole and bearing numerous slender pedicels from its dilated apex, flowers white fragrant 5-merous, calyx teeth pointed or rounded often somewhat inconspicuous and deciduous, minutely ciliate, corol-tube hairy within at the apex, anthers on conspicuous filaments which are attached to near the centre of the back of the anther, style much exserted, stigma mitre-shaped and 2-lobed at the apex, drupe when ripe compressed and somewhat didymous broadly obovate and slightly emarginate. *Gærtn. fr.* 3 *p.* 94. *t.* 196 ;—*WA. Prod. p.* 425. C. cymosum, *Pers.* C. umbellatum, *Wight Icones tab.* 1034. Psydrax dicoccos, *Gærtn.* Webera cymosa, *Willd. Sp. p.* 1224. Rondeletia cymosa, *Poir.* Cupea cymosa, *DC.*

This very handsome tree with deep green foliage, is most abundant on most of the mountains in this presidency, particularly so on all the hills in the Salem district; it is called Nalla balsu both in Tamil and Teligu, Ursool on the Bombay ghats, and Tolan in the Ooria country ; it is also very common in Ceylon, where it is called Poruwa. The variety here figured was considered by Wight as a distinct species from the didymum of our eastern coast, but it only differs slightly in the inflorescence, and is not now considered specifically distinct ; the wood is close grained and hard, and very dark coloured in the centre.

Analysis.

1. A flower bud, showing the lobes valvate.
2. A full flower.
3. The same corol removed, showing the style and mitre-shaped stigma.
4. A corol opened out.
5. Anthers, front and back view.
6. Ovary cut vertically, showing the ovules solitary in each cell and attached to near the apex of the axis, and the prominently raised slightly hairy disk, which is hollow in the centre where the style enters.
7. Ovary cut transversely.



Covenda, del.

Dampfry Lith.

Canthium didymum (Gaertn.)

IXORA PARVIFLORA. (Nat. ord. Rubiaceæ.)

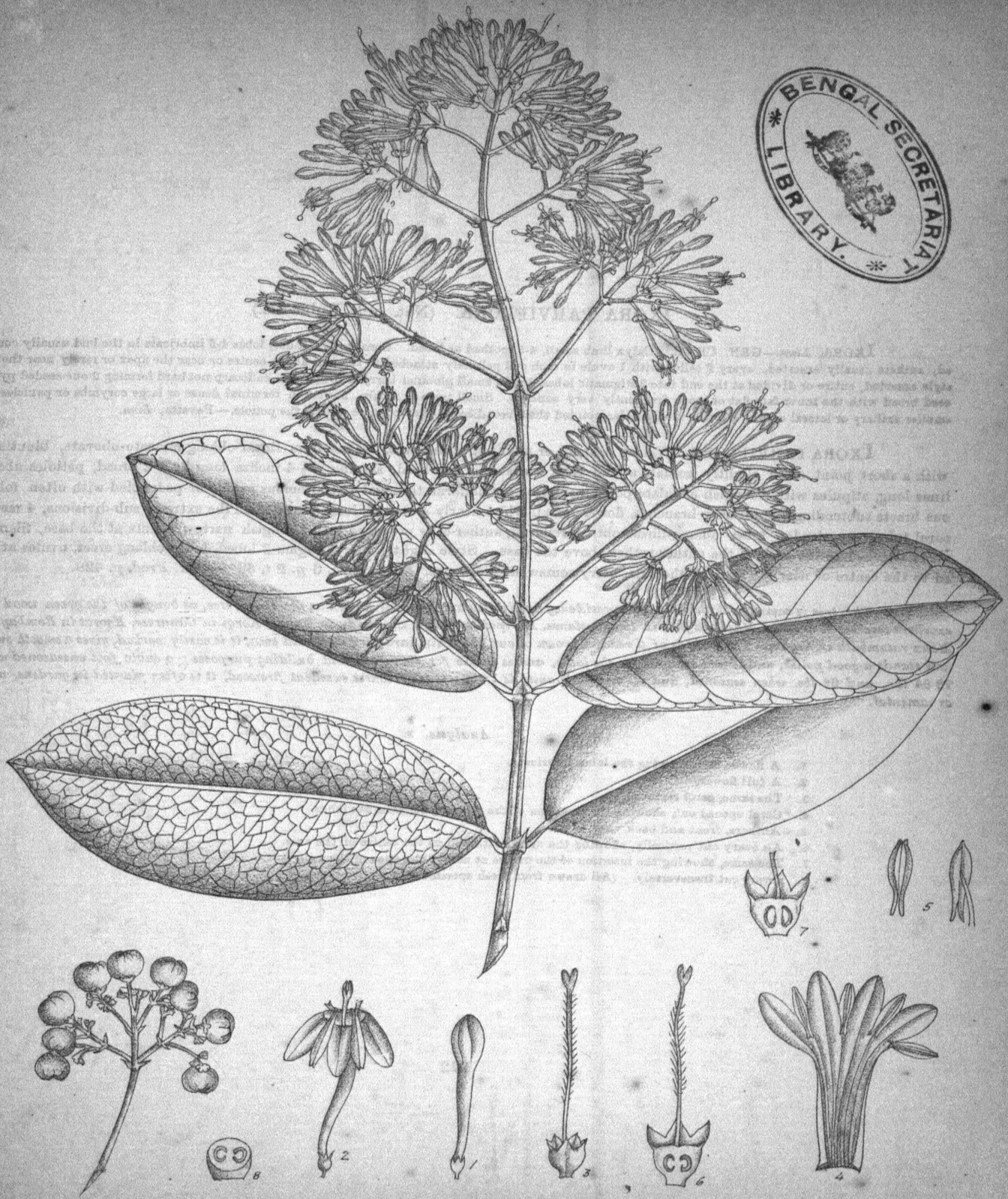
IXORA. *Linn.*—GEN. CHAR. Calyx limb small, 4-5 toothed or lobed. Corol-tube slender, lobes 4-5 imbricate in the bud usually contorted, anthers usually exserted, ovary 2 celled with 1 ovule in each cell peltately attached to the axis at the centre or near the apex or rarely near the base, style exserted, entire or divided at the end into 2 stigmatic lobes, fruit a small globular berry or drupe, the endocarp not hard forming 2 one-seeded pyrenes seed broad with the inner face flat or more frequently very concave. Small trees or shrubs, flowers in terminal dense or large corymbs or panicles or in smaller axillary or lateral cymes, stipules interpetiolar pointed their broad bases often connate within the petiole.—Pavetta, *Linn.*

IXORA PARVIFLORA. (Vahl.) A small or middling sized tree, leaves from linear-oblong cuneato-obovate, bluntish or with a short point often slightly cordate at the base, coriaceous and hard, shining, 3½-4 inches long by 1-2 broad, petioles about 3 lines long, stipules with a longish subulate point, panicles corymbiform terminal trichotomous sessile or peduncled with often foliaceous bracts subtending the primary branches, flowers small white nearly ½ an inch long, crowded on the extreme sub-divisions, 4 merous, corol tube very slender, lobes oblong-linear obtuse reflexed, anther-cells produced into 2 longish narrow points at the base, filaments short attached to the back of the anther rather above the base. Style slightly hairy, stigma 2 lobed, lobes oblong erect, ovules attached to the centre or near the apex of the axis, berry somewhat didymous. *Vahl. Symb.* 3 *p.* 2 *t.* 52 ;—*WA. Prod. p.* 429.

This tree is common throughout this presidency and in Ceylon, it is well known as the Torch tree, as boughs of the green wood make excellent torches; it is called Masal-ka jhar in Hindoostanee, Karipal in Teligu, Shulundu in Tamil, Korqi in Canarese, Koorat in Bombay, and Maha ratambalu in Ceylon. The wood is of a reddish brown colour, the grain hard very close and even, it is easily worked, gives a smooth surface and stands a good polish, and is well adapted for the lathe, and is in use for furniture and building purposes ; a cubic foot unseasoned weighs 78 84 *lbs., and* 66 *lbs. when seasoned, and its specific gravity is* 1·056 ; *it is of course excellent firewood, it is often planted in gardens, and is ornamental.*

Analysis.

1. A flower bud, showing the lobes imbricate.
2. A full flower.
3. The same, corol removed.
4. Corol opened out, showing the insertion of the stamens between the lobes.
5. Anthers, front and back view.
6. An ovary cut vertically, showing the ovules attached to the centre of the axis.
7. The same, showing the insertion of the ovules at nearly the apex of the axis.
8. Ovary cut transversely. (All drawn from fresh specimens.)



BENGAL SECRETARIAT LIBRARY.

Govindo del. Dunnigray, Lith.

Ixora parviflora (Vahl.)

DIPLOSPORA APIOCARPA. (Nat. order Rubiaceæ.)

DIPLOSPORA. *DC.*—GEN. CHAR. Calyx limb short 4 toothed truncate, corol-tube short, lobes 4 spreading imbricate in the bud, anthers exserted, ovary 2-celled with many or rarely only 2 ovules in each cell attached to a small peltate placenta, style with 2 stigmatic lobes, fruit a globular berry, seeds solitary or few in each cell. Trees, flowers in axillary clusters or loose cymes or in pairs of clusters with one terminal one forming a short terminal panicle, stipules interpetiolar pointed with a broad base.--Discospermum, *Dalz.*

DIPLOSPORA APIOCARPA. (Dalz.) A large tree, polygamo-diæcious, branches tetragonal, leaves glabrous ovato-anceolate with a blunt acumination up to 6-7 inches long by 2-3 inches broad furnished with hollow hairy glands in the axils of the veins beneath, petioles 6 lines long, stipules triangular glabrous, peduncles axillary about 2 lines long, flowers 3-8 subsessile, calyx urceolate truncate subentire or minutely and irregularly toothed furnished (as are the stipules) with a gummy substance, glabrous or with a few weak hairs on the outside, more or less hairy within the tube, filaments generally inserted near the apex of the tube a little below the lobes, but sometimes arising from near the base, stigma with 2 spreading flat lobes, cells of the ovary 4-8 ovuled, fruit globose with a circular ring-like scar at its apex, 8-9 lines in diameter, seeds flat, disk like, irregularly compressed 4-8 in each cell. *Dalz. Hook. Kew Journ. of Bot. vol.* ii. *p.* 257.

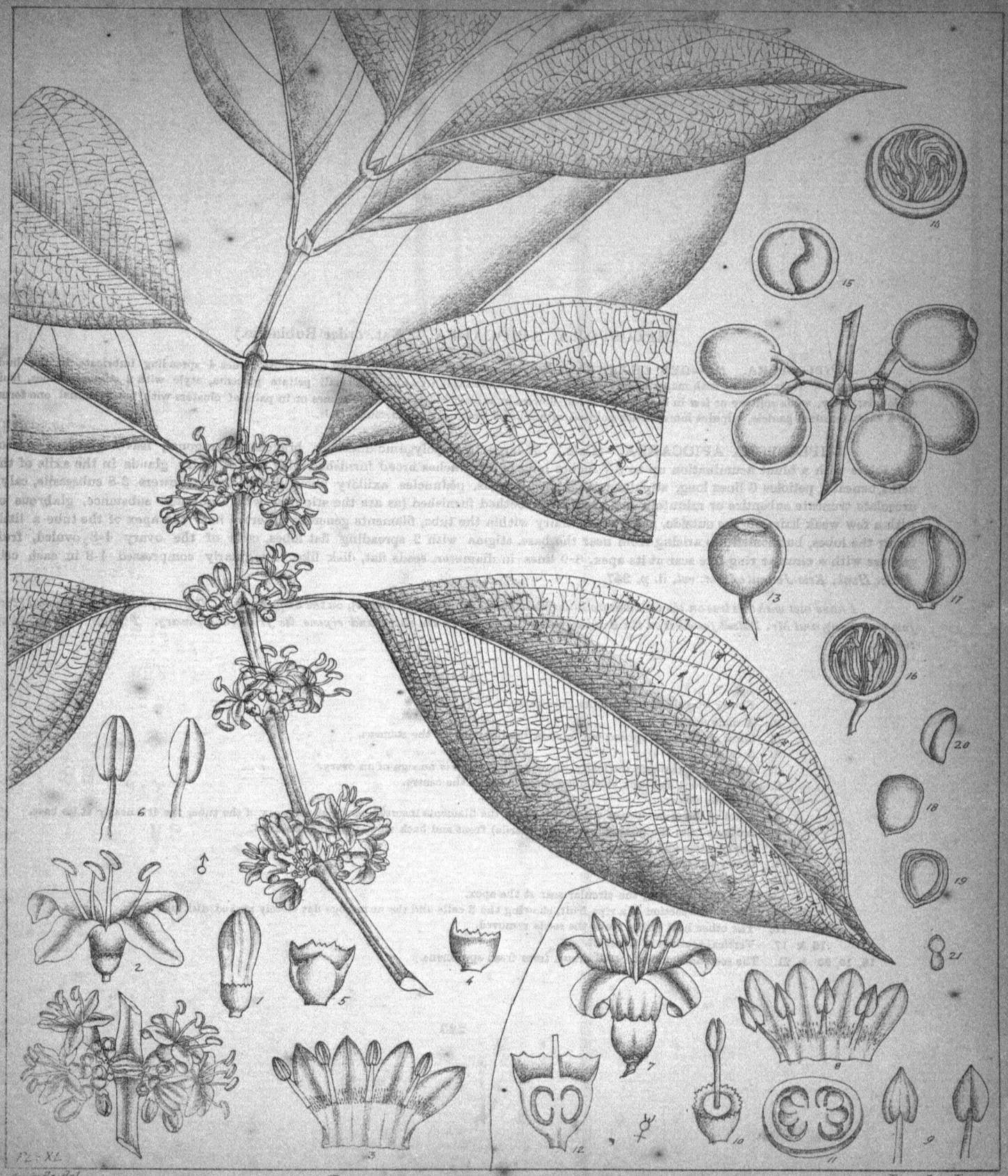
I have met with this tree on the Coimbatore hills (Muti-kolam 4500 feet elevation), on the Sispara ghat (Nilgiris), and in the Wynad (2800 feet elevation), and Mr. Dalzell found it on the Bombay ghats; it flowers in the rains and ripens its fruit in January. I know nothing of its timber.

Analysis.

1. Flower bud showing the lobes imbricate.
2. A male flower.
3. Corol of the same opened out to show the insertion of the stamens.
4. A calyx.
5. A calyx cut through vertically, showing that there is no sign of an ovary.
6. Anther front and back view, filaments adnate to the centre.
7. A fertile flower.
8. Corol of the same opened out showing 3 of the filaments inserted nearly at the apex of the tube, the 4th nearly at its base.
9. Anthers from the same flower (quite sterile) front and back view, filament basifixed.
10. Ovary, style and stigma.
11. Ovary cut transversely.
12. Ovary cut vertically.
13. Ripe fruit showing the circular scar at the apex.
14. Transverse section of a ripe fruit, showing the 2 cells and the numerous flat closely packed disk-like seeds.
15. The other half of the fruit, the seeds removed.

16 & 17. Vertical sections of the fruit.

18, 19, 20 & 21. The seed and embryo. (All drawn from fresh specimens.)



Pl. XL

Govindo del.

Dampney Lith.

Diplospora apiocarpa (Dalz.)

WENDLANDIA NOTONIANA. (Nat. order Rubiaceæ)

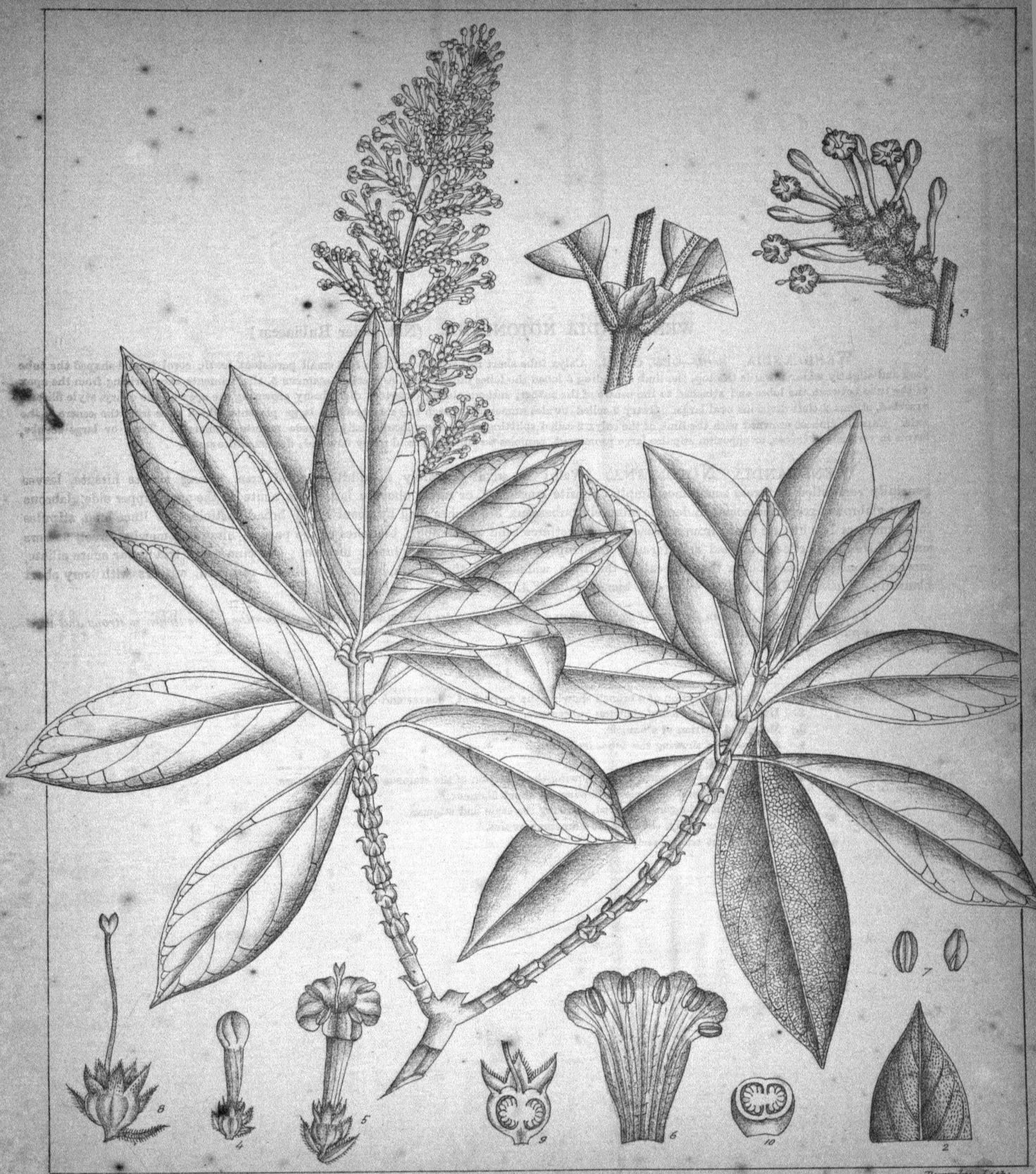
WENDLANDIA. *Bartl.*—GEN. CHAR. Calyx tube short rather globose, limb of 5 small persistent teeth, corol funnel-shaped the tube long and slightly wider towards the top, the limb spreading 5 lobed the lobes imbricate in æstivation, stamens 5, the filaments short arising from the apex of the tube between the lobes and attached to the centre of the anther, anthers oblong exserted, dish fleshy crowning the apex of the ovary, style filiform exserted, stigma 2-cleft divisions oval large. Ovary 2-celled, ovules numerous in each cell attached to a large placenta which rises from the centre of the axis. Capsule globose crowned with the limb of the calyx 2-celled splitting at the apex loculicidally. Seeds minute numerous. Trees or large shrubs, leaves in verticels of threes, or opposite, stipules large prominent, panicles terminal thyrsoid many flowered, flowers white small.

WENDLANDIA NOTONIANA. (Wall.) A small or rarely a middling sized tree, young shoots hirsute, leaves generally verticelled in threes sometimes simply opposite lanceolate, or rarely obovate lanceolate acute at the apex, upper side glabrous or sub-glabrous except the costa, underside minutely pubescent, 3-5 inches long by about 1¼-1½ broad, petioles 2-3 lines long, stipules large more or less hirsute ovate from a broad base sometimes bifid at the apex, branches of the panicle hirsute somewhat erect, flowers small white more or less crowded and forming interrupted spikes, calyx and bracts hirsute. Calycine teeth triangular acute ciliate, corol glabrous 6-8 times longer than the calyx, the tube widened at the mouth, lobes oval obtuse recurved, anthers with very short filaments. *Wall.*;—*WA. Prod. p.* 403. W. bicuspidata, *WA. l. c.*

This small tree is common in most of our alpine and subalpine jungles from 2000 *to* 7000 *feet elevation. The timber is strong and used for various purposes by the natives.*

Analysis.

1. A magnified portion of a branch showing the verticel of 3 leaves and the 3 stipules.
2. Under surface of a leaf showing pubescence.
3. Magnified portion of a panicle.
4. A flower bud showing the lobes imbricate.
5. A full flower.
6. Corol removed and opened out, showing the insertion of the stamens between its lobes.
7. Anthers front and back view, showing the short filament.
8. A flower with the corol removed, showing the style and stigma.
9. Ovary cut vertically, showing the numerous ovules.
10. The same cut transversely.



Gomedo del. Dumphry Lith.

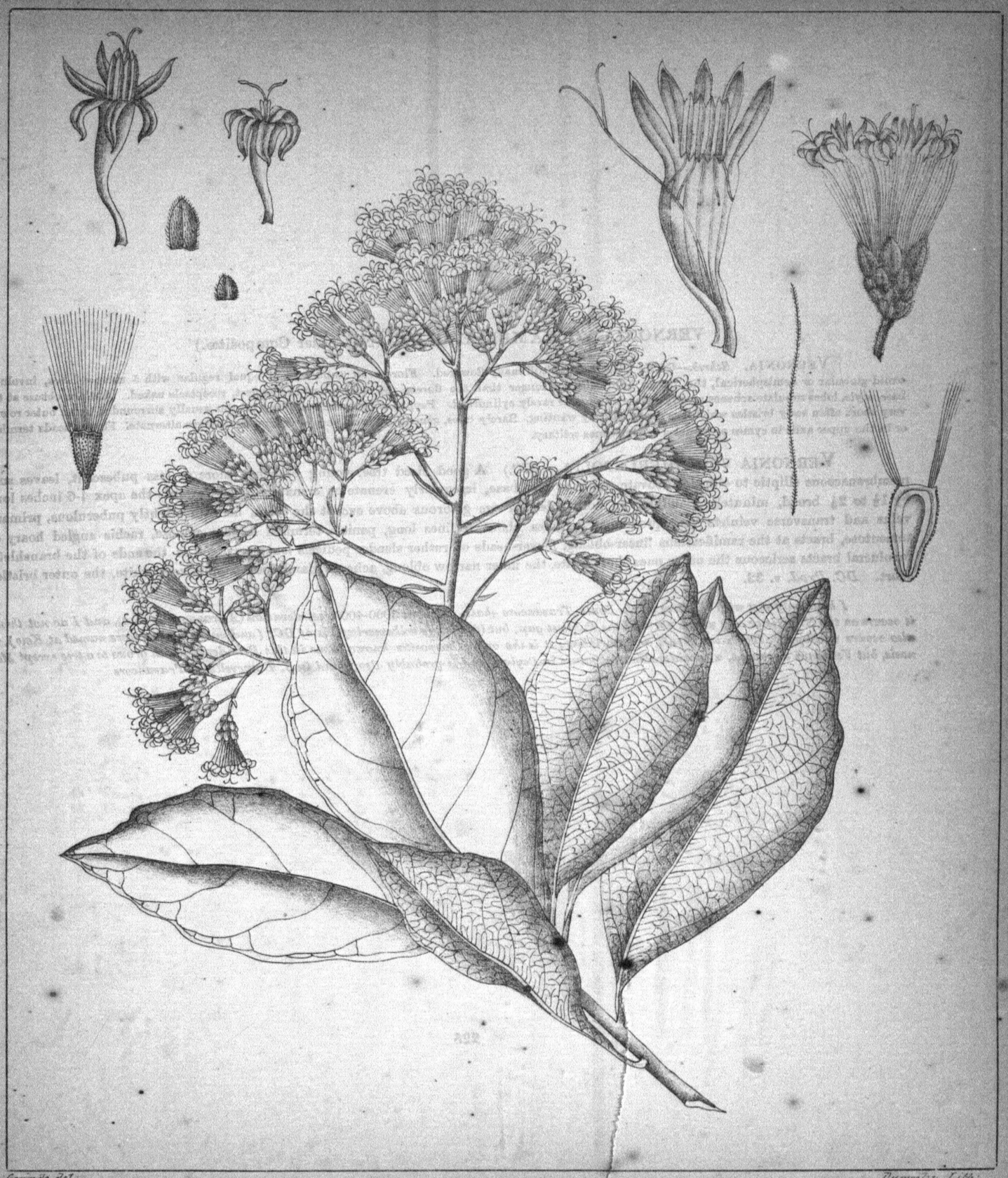
Wendlandia Notoniana (Wall.)

VERNONIA VOLKAMERIÆFOLIA. (Nat. order Compositæ.)

VERNONIA. *Schreb.*—GEN. CHAR. Capituli many-flowered. Florets all tubular and equal regular with 5 narrow lobes, involucre ovoid-globular or hemispherical, the bracts imbricate not longer than the florets, the inner bracts the longest, receptacle naked. Anthers obtuse at the base, style, lobes subulate achenes mostly striate or angular rarely cylindrical. Pappus of numerous capillary bristles usually surrounded by an outer row or very short often scaly bristles which are rarely entirely wanting. Rarely trees, generally herbs, shrubs or climbers, leaves alternate. Flower-heads terminal or in the upper axils in cymes or panicles or sometimes solitary.

VERNONIA VOLKAMERIÆFOLIA. (DC.) A good sized tree, young branches more or less pubescent, leaves submembranaceous elliptic to elliptico-obovate, acute at the base, irregularly crenate or crenately-lobed towards the apex 4-6 inches long by 1½ to 2½ broad, minutely glandular on both sides, in age glabrous above except the costa, beneath slightly puberulous, primary veins and transverse veinlets very prominent, petioles about 6 lines long, panicle terminal leafless cymose, rachis angled hoary or tomentose, bracts at the ramifications linear-oblong, flower-heads on rather slender pedicels laxly arranged at the ends of the branchlets, involucral bracts sericeous the outer ones short ovate, the inner narrow oblong, achenes glandulose, pappus very white, the outer bristles short. *DC. Prod.* v. 32.

I have only met with this tree on the South Travancore ghats at about 3000-4000 *feet elevation (Attraymallay ghat), and I do not think it occurs on the Nilgiris or any where north of the Palghat gap, but if it is the volkameriæfolia of DC. (and my specimens were named at Kew), it also occurs in Nepal. Its timber is soft and worthless; it is the only Compositæ known to me in this Presidency which grows to a tree except Monosis, but Vernonia Javanica, a considerable tree, occurs in Ceylon, and is probably also found in S. Tinnevelly or Travancore.*



Govindo del. Dampier Lith.

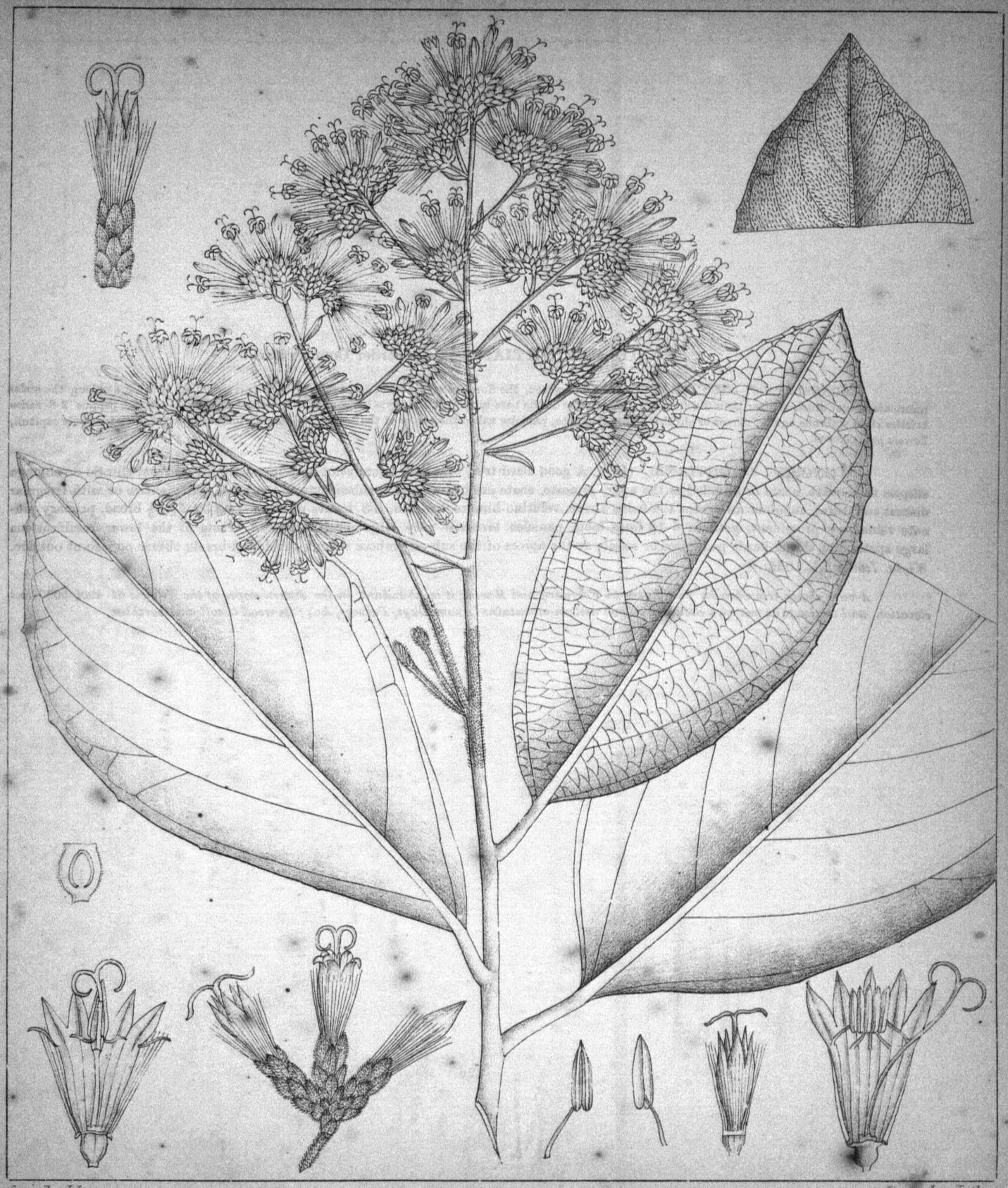
Vernonia volkameriafolia (D.C.)

MONOSIS WIGHTIANA. (Nat. order Compositæ.)

MONOSIS. *DC.*—GEN. CHAR. Capituli 1-flowered, the floret tubular and equal regular with 5 narrow lobes, involucre oblong the scales imbricate obtuse much shorter than the floret, anthers obtuse at the base without tails, style-lobes subulate, achenes glabrous terete, pappus 2-3 series bristles rigid scabrous equal. Trees or shrubs, leaves alternate, panicles naked the apices of the branchlets bearing numerous subumbellate sessile capituli, flowers rose-colored.

MONOSIS WIGHTIANA. (DC.) A good sized tree, branches terete velutino-tomentose, leaves from elliptic or oblongo elliptic to obovate, acute or rounded at the apex, cuneate, acute or obtuse or even subcordate at the base, quite entire or with irregular distant serratures, subglabrous except the veins above, velutino-hirsute beneath, 6-8 inches or more long by 2½-3½ broad, primary pinnate veins very prominent, petioles 6-12 lines long, panicles terminal very large much branched bracts of the lower ramifications large spathulate, flower-heads pedicelled or sessile at the apices of the sub-corymbose ramuli, involucral-bracts obtuse pubescent outside. *Wight. Icones tab.* 1085.

A very showy tree when in full flower in February and March ; it is abundant on the eastern slopes of the Nilgiris at 4000-5000 *feet elevation, and is also to be met with elsewhere on our western mountains (Anamallays, Pulneys, &c.) ; its wood is soft and worthless.*



Govindo del. Humphrey Lith.

Monosis Wightiana, (DC.)

VACCINIUM LESCHENAULTII. (Nat. order Ericaceæ.)

VACCINIUM. *Lindley.*—GEN. CHAR. Calyx tube adnate, the limb of 4-5 teeth, corol superior, the tube ovate campanulate or shortly cylindrical, the limb of 4-5 short lobes or teeth. Stamens double as many as the calyx teeth and corol lobes. Anther-cells elongated into long tubular points and opening at the apex of these in oblique pores, ovary inferior 4-5 celled with several ovules in each cell attached to the centre of the axis, fruit a berry. Trees or shrubs, leaves alternate, flowers showy.

VACCINIUM LESCHENAULTII. (Wight.) A small or middling sized tree, young shoots puberulous at length glabrous, leaves from oval to ovate, from pointed and mucronate to quite retuse at the apex, serrated, paler beneath, slightly puberulous on the costa and veins when young at length quite glabrous, $1\frac{1}{2}$-$2\frac{1}{4}$ inches long by 1-$1\frac{1}{4}$ broad, venation penniveined and looped within the margin, petals about 3 lines long puberulous, racemes axillary or terminal or on leafless shoots, flowers pink very showy, pentamerous, calyx-lobes ciliate and minutely green-gland tipped at the apex, filaments hairy dilated at the base narrowed upwards attached to near the apex of the lower portion of the anther-cells just between the 2 prominent bristles, stigma with a few black erect hairs. *Wight Icones tab.* 1188. V. arboreum, *Lesh. not Michx.* Agapetes ? arborea, *Dun. in DC. Prod.* vii. Andromeda symplocifolia, *Wall. l. n.* 1522.

A very pretty tree abundant on the Nilgiris at the higher elevations, and on the Anamallays, Pulneys, and Ceylon mountains; the fruit, which is about as large as currants, is eaten, it is an agreeable acid and makes good tarts; the tree is called Andoovan on the Nilgiris. The wood is rose colored, with a red heart, wavy grained and pleasant to work, and would be excellent for cabinet work.

Analysis.

1. A flower bud.
2. A full flower.
3. The same, corol removed.
4. The tubular corol removed and opened out.
5. A flower, corol and all the stamens except one removed, to show the disk, style, and insertion of the stamens.

6*A*. Anthers, front view, showing the hairy filament dilated at its base and the cells elongating into terminal tubular points with a pore at the apex.

6*B*. Anther back view, showing the filament adnate to the cells just between the 2 bristles.

6*C*. Anther, side view.

7. Ovary cut vertically.
8. Ovary cut transversely. (Drawn from fresh specimens.)

Covurdo del.

Dempsey Lith.

Vaccinium Leschenaultii.

RHODODENDRON ARBOREUM. (Nat. order Ericaceæ.)

RHODODENDRON. *Linn.*—GEN. CHAR. Calyx free 5 lobed or toothed; corol obliquely campanulate rarely contracted into a narrow tube, or rotate with scarcely any tube, 5 lobed or very rarely 10 lobed; stamens 10 or rarely more declinate, anthers without awns, the cells opening in terminal pores; ovary 5-10 celled; capsule opening septicidally in 5-10 valves. Trees or shrubs, leaves ever green entire often with a mealy or scaly pubescence; flowers in dense terminal corymbs or heads or rarely solitary issuing with the young leaves from scaly buds.

RHODODENDRON ARBOREUM. (Smith.) A small or middling sized tree sometimes of considerable girth, leaves crowded at the ends of the branches very coriaceous lanceolate entire or slightly waved at the margin, glabrous above except the costa, densely rusty beneath with copious close set brown scales, 3-4¼ inches long by 1¼-1½ broad, pinnate veins very prominent thick and much raised on the under surface of the leaf, reticulated veinlets and venules very numerous and forming a very beautiful minute net work (as seen under the lens when the dense mass of rusty scales is removed), petioles 4-7 lines long furnished with blackish pubescence, flowers 1½ to nearly 2 inches long bright crimson or rarely white or pale rose arranged in dense terminal compact heads or corymbs, pedicels 4-5 lines long, densely covered as is the calyx with stellate pubescence which is snow-white when in flower and reddish when in young fruit, a large very membranaceous silky obovato-spathulate pointed concave bract (about 1 inch long and ½ inch broad) at the base of each pedicel and 2 small subulate bracteoles on the pedicel either both near the base or one of them, sometimes at the centre, all soon becoming scariose and early deciduous, calyx small rather irregularly 5-lobed, corol broadly tubular, the limb shortly 5-lobed, the lobes emarginate, stamens 10 very unequal in length, anther-cells broader upwards, filaments attached to near the apex at the back, ovary densely sericeous with silky white hair, stigma large capitate depressed and hollow in the centre, young fruit dotted with reddish-brown stellate pubescence, capsule narrow oblong slightly recurved quite glabrous in age about 1 inch long. *Smith in DC. Prod.* vii. 720.

This very gorgeous tree is most abundant on the Nilgiris, Pulneys, Anamollays and Ceylon mountains, from an elevation of 4800 *upwards, and if it is the true R. arboreum, it is also found in the Himalayas; but it is said to differ somewhat from the Himalayan tree, particularly in the pubescence on the under surface of the leaves, and was long ago distinguished as R. nobile, though since joined with arboreum. I have however no specimens of the Himalayan tree for comparison, but I have given a most detailed description and careful analysis from fresh specimens. The wood is occasionally used for gun stocks, posts and other purposes; it is close in the grain, but wanting in fibre and shrinks and twists in seasoning. The tree is called Billee and Poomaram on the Nilgiris, and Ma-ratmal in Ceylon; it is to be found in flower all the year round, but most profusely so in February.*

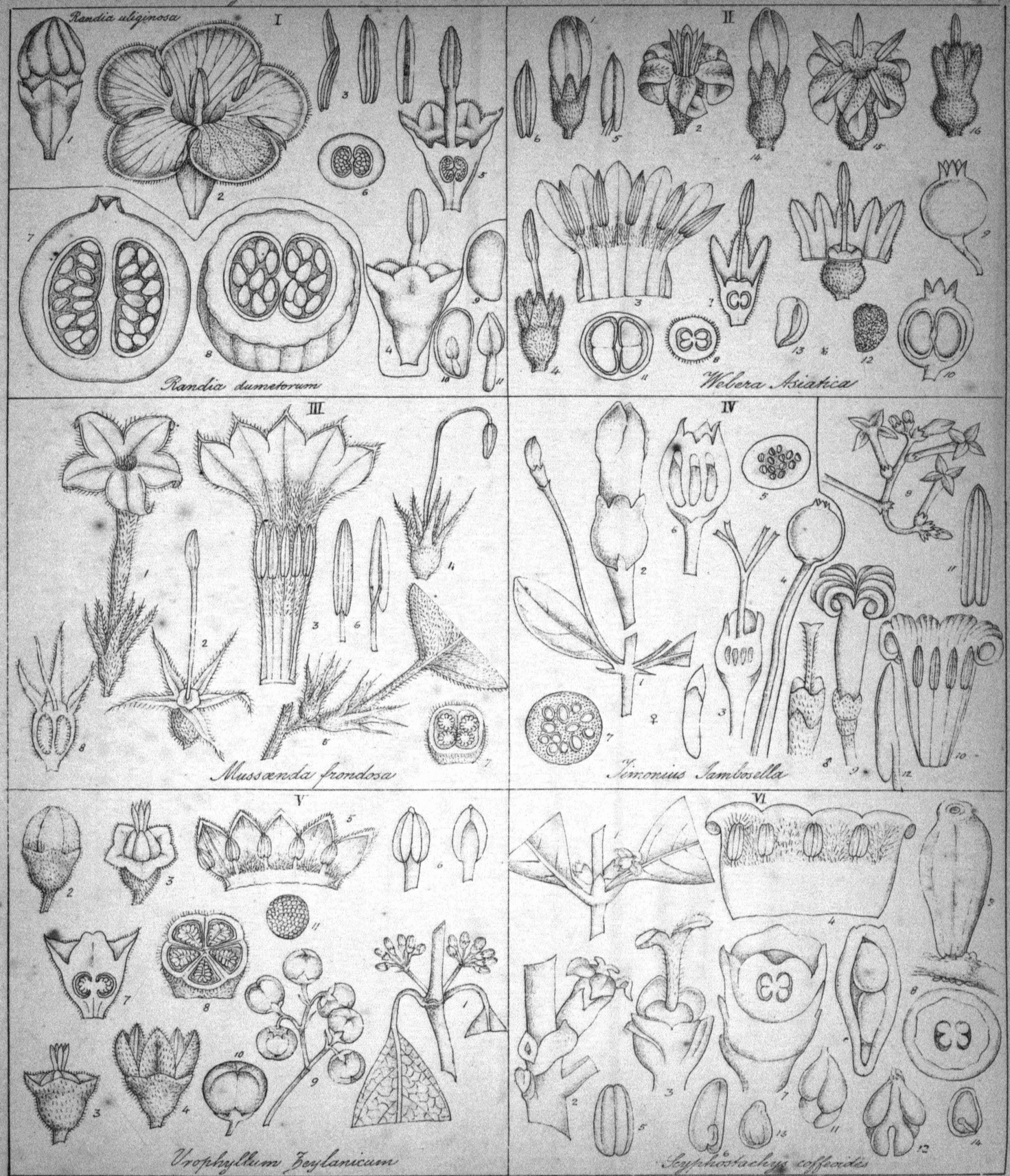
Analysis.

1. Under surface of a leaf showing the dense matted pubescence and the prominently raised veins.
2. A flower bud with the large bract and 2 bracteoles.
3. A full flower.
4. The large concave bract.
5. Front and back view of the bracteoles.
6. A flower, corol removed to show the 10 declinate unequal stamens, the bract and bracteoles attached to the base of the pedicel.
7. Corol opened.
8. Ovary and style.
9. Pedicel and calyx, showing the two bracteoles attached to the base of the flower.
10. The same only with one of the bracteoles attached half way up the pedicel.
11. The stellate tuft of hairs which forms the pubescence on the calyx and pedicels.
12. Anther front view, showing the 2 pores at the apex of the cells.
13. Anther back view, showing the attachment of the filament.
14. The same, side view.
15. Ovary cut vertically.
16. Very young fruit cut transversely.
17. Young fruit.
18. The ripe capsule burst septicidally (the seed removed), showing the valves separated from the plancentiferous axis which bears the seed.
19. Inside view of one of the valves.
20. Side view of a portion of the same. (Drawn from fresh specimens.)

Gouindo del. Nuroyly lith.

Rhododendron arborescens Sm.

Randia uliginosa — Rubiacea



Murphy Lith.

BENGAL SECRETARIAT
LIBRARY.

ORDER VII-A.—VIOLARIEÆ.

Gen. Char. Flowers hermathrodite or rarely polygamous, irregular, or regular, sepals 5 equal or unequal imbricate in æstivation, petals 5 nearly equal or the lower larger unguiculate or sessile, stamens 5 free or monadelphous, anthers erect 2 celled with the connective generally produced beyond the cells, ovary sessile 1-celled, placentas usually 3, each with 1-many anatropous ovules, style usually simple sometimes clavate, stigma terminal or lateral, fruit a capsule dehiscing loculicidally or septicidally 1-many seeded, seeds with a fleshy albumen and axile embryo. Herbs, shrubs or small trees, leaves usually alternate entire serrate or crenate stipulate, flowers axillary or terminal solitary fascicled racemose or panicled, small in the woody species.

A small order only represented in Southern India by one small tree Alsodeia Zeylanica first discovered in Ceylon, and now detected in South Travancore and in the Wynad. Of herbaceous plants this order gives us 2 indigenous species of Viola and 2 of Ionidium and 1 species of Scyphellandra, a small undershrub found in Ceylon.

ALSODEIA. Thouars.

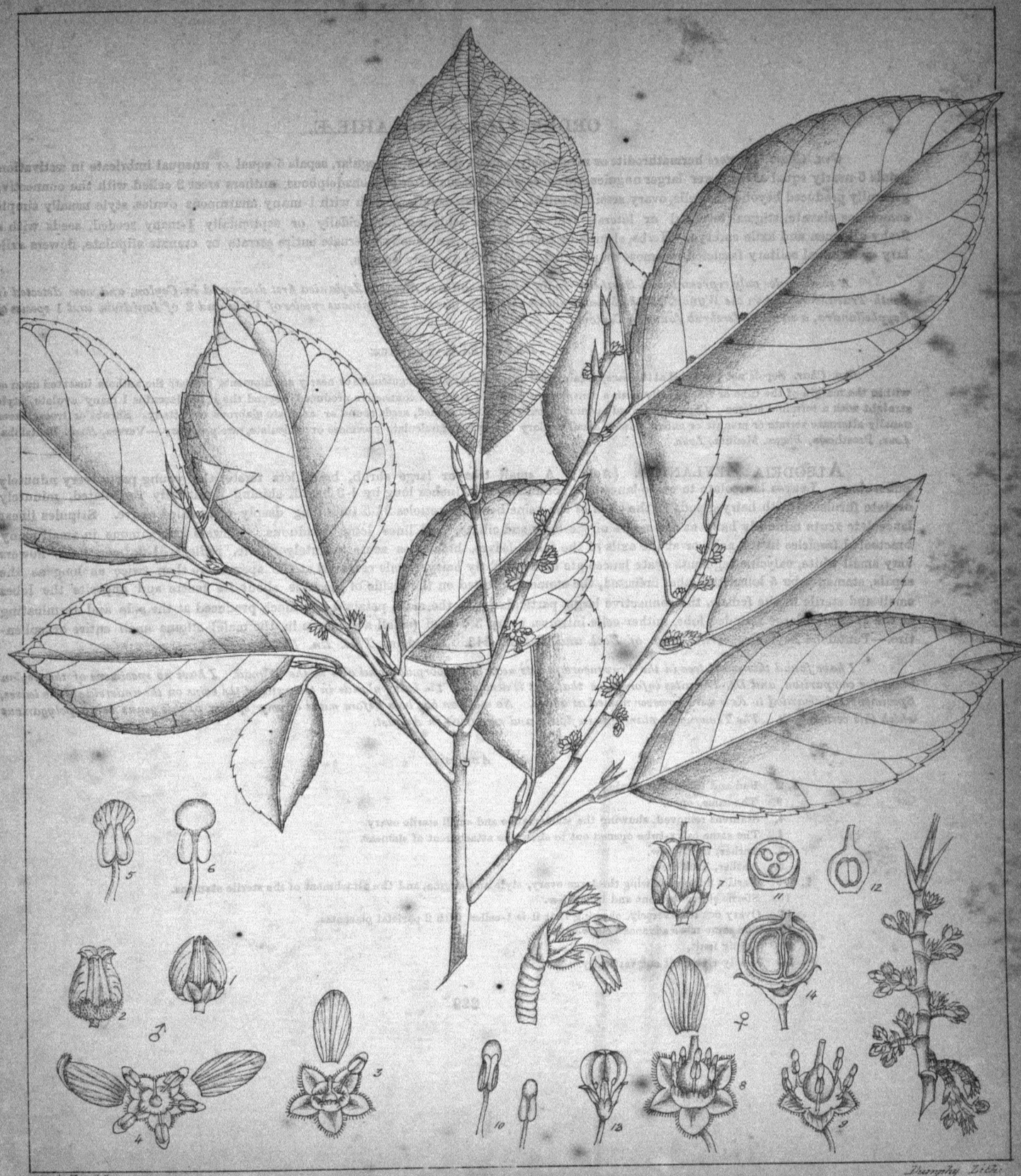
Gen. Char. Sepals not produced at the base, petals equal or nearly equal exunguiculate or nearly so, filaments connate the anthers inserted upon or within the margin of the tube or free usually with a conspicuous dorsal or terminal connective produced beyond the cell, placentas 1 many ovulate, style straight with a terminal stigma. Capsule 3 valved opening loculicidally few seeded, seeds round or angulate glabrous or cottony. Shrubs or trees, leaves usually alternate serrate or crenate or entire, flowers small axillary or terminal fasciculate racemose or paniculate, rarely solitary.—Vareca, *Roxb.* Pentaloba, *Lour.* Prosthesia, *Blume.* Medusa, *Lour.*

Alsodeia Zeylanica. (Arnt.) A small tree or large shrub, branchlets terete, the young parts very minutely puberulous. Leaves lanceolate to ovato-lanceolate acuminate 2½-6 inches long by 1-3 broad, shining beautifully reticulated, minutely dentate furnished with hairy glands in the axils of the veins beneath, petioles 2½-5 lines long deeply channelled above. Stipules linear lanceolate acute minutely hairy at the centre of the back and ciliate, 3-4½ lines long, deciduous. Flowers polygamous in small many bracteoled fascicles in the axils or at the axils of the fallen leaves, bracteoles acute minutely ciliate, pedicels 1-2 lines long, flowers very small white, calycine-segments ovate lanceolate acute slightly hairy, petals recurved at the apex more than twice as long as the sepals, stamen-tube 5 lobed the lobes crenated, the stamens inserted on the inside of the tube about its centre and opposite the lobes small and sterile in the female, the connective large particularly in the male, petaloid and much produced at the side and terminating at the apex in a large rounded lobe, anther-cells introrse, ovary 3 ovuled (small and sterile in the male) stigma small entire or subentire.—Pentaloba Zeylanica, *Arnt. Mag. of Zool. and Bot.* ii. 543. Alsodeia, *Thw. En. Pl. Zey. p.* 21.

I have found this small tree in the Travancore forests near Colatoorpalay and also in the Wynad. I have no specimens of the Ceylon plant for comparison, and Dr. Thwaites informs me that that is devoid of the hairy glands in the axils of the veins on the underside of the leaves. Specimens I forwarded to Kew were however named as above. No mention has been before made of any species of this genus being polygamous which this certainly is. The Travancore plant was in flower and ripe fruit in August.

Analysis.

1, 2. Bud and full flower (male.)
3. The same, open.
4. Stamens removed, showing the stamen-tube and small sterile ovary.
4. The same calyx-tube opened out to show the attachment of stamens.
5. Anther, front view.
6. Anther, back view.
7, 8, 9. Fertile flowers showing the large ovary, style and stigma, and the attachment of the sterile stamens.
10. Sterile stamens, front and back view.
11. Ovary cut transversely, showing that it is 1-celled with 3 parietal placentas.
12. The same more advanced cut vertically.
13. Young fruit.
14. Nearly ripe fruit cut vertically.



Gavinão del. Dwyer Lith.

Alsodeia zeylanica (Arnt.)

STERCULIA HAYNII. (Nat. order Sterculiaceæ.)

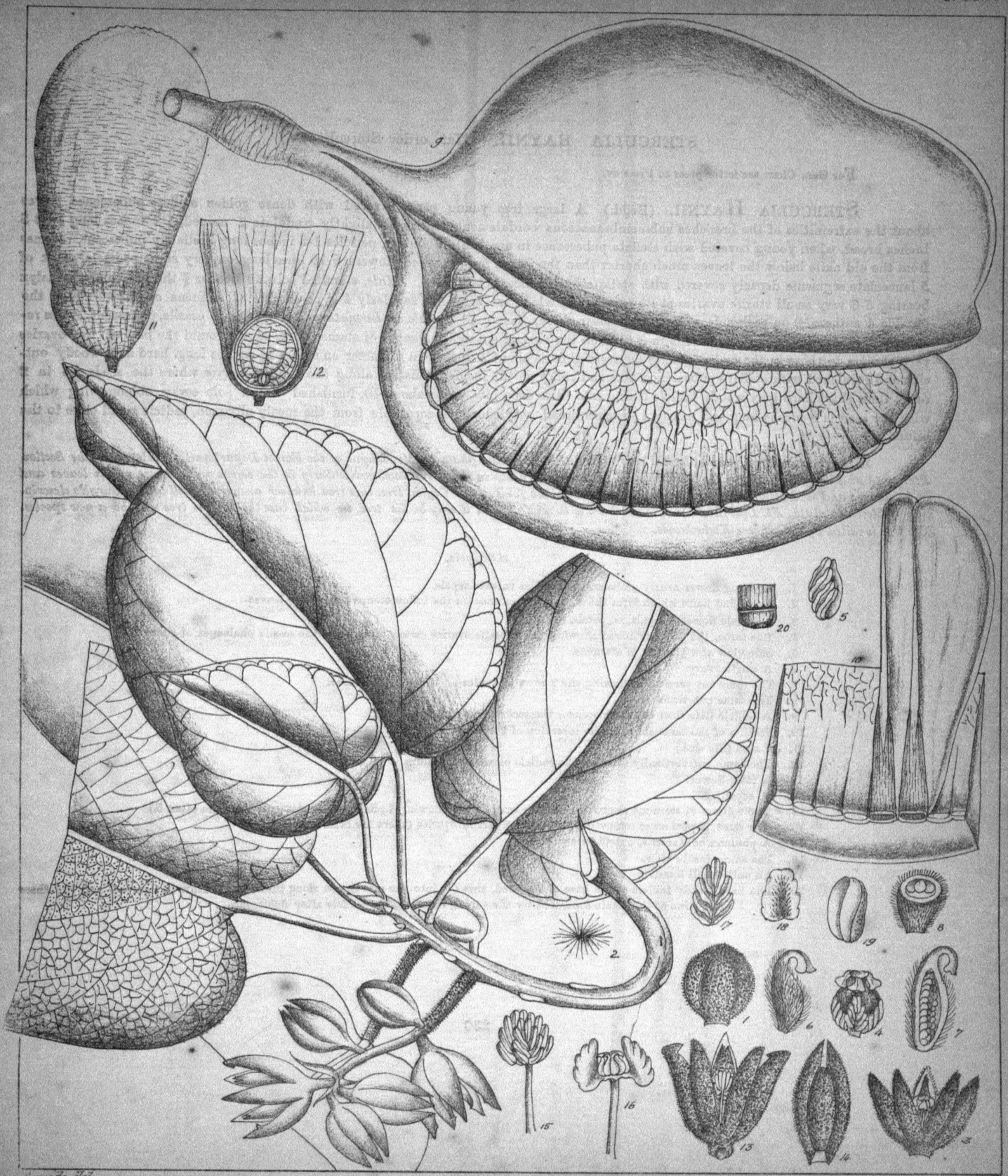
For Gen. Char. see letter press to Plate cv.

STERCULIA HAYNII. (Bedd.) A large tree young parts covered with dense golden stellate pubescence, leaves about the extremities of the branches submembranaceous cordate acute entire or slightly undulate 7 nerved, 4-6 inches long by 3-5 inches broad, when young covered with stellate pubescence in age quite glabrous, petioles 1-2 inches long stellately pubescent, racemes from the old axils below the leaves much shorter than the leaves few flowered, flowers 9-10 lines long on very short pedicels, calyx of 5 lanceolate segments densely covered with stellate pubescence, petals none. *Male*, staminal column slender $\frac{3}{4}$ the length of the calyx bearing 5-6 very small sterile ovaries at its apex round which are arranged regularly 4-5 phalanges of stamens each bearing on the outside 4 anthers, 2 on each side, anther cells linear oblong flexuose. *Female or hermathrodite*, ovaries 5 sessile, pubescent, styles recurved 2 lobed, ovules very numerous in 3 rows on the ventral suture, phalanges of stamens 4-5, sessile round the base of the ovaries very similar to those in the male, follicles depresso-globose about 5 inches in diameter on stalks $1\frac{1}{2}$ inches long, hard and woody outside and furnished with stellate pubescence, soft and corky on the inside, dehiscing along the ventral suture where the seeds lie in 2 rows, their short hard grey woody funicle fitting into little deep pits, seeds about 40, furnished with a soft corky oblong wing which with the seed is 3 inches long and nearly $1\frac{1}{2}$ inches broad, cotyledons not separable from the mealy albumen, radicle small close to the hilum.

This interesting tree has just been discovered on the Tinnevelly ghats by Mr. Hayne of the Forest Department, it belongs to the Section Pterygota and it differs from the Ceylon Sterculia (Pterygota) alata in many respects, particularly in the shape and texture of its leaves and in its flowers and seed being 3 times as large. I have not seen the fruit of the Ceylon tree, this tree however answers so well to Roxburgh's description of Sterculia alata, Fl. Ind. iii. p. 152, that I have a suspicion that it may be his tree, in which case the Ceylon tree will be a new species. The tree is called by the natives Kodathanee.

Analysis.

1. A young flower nearly globose showing the valvate sepals.
2. Magnified hairs which form the stellate pubescence on the inflorescence and young leaves.
3. A female flower 5 sepals, no petals.
4. The same, the calyx removed showing the 5 sessile ovaries closely adnate and the sessile phalanges of stamens.
5. Side view of a phalanx of stamens.
6. A single ovary.
7. The same cut vertically showing the 3 rows of ovules on the ventral suture.
8. The same cut transversely.
9. A follicle (life size) after dehiscence, the seeds removed.
10. Portion of the same showing the insertion of the seeds.
11. A seed (life size.)
12. The same cut vertically showing the radicle close to the hilum.
13. A male flower
14. A sepal.
15. The column of stamens removed from the male flower showing 4 phalanges of stamens (there are often 5.)
16. The same, 2 phalanges removed to show the 6 sterile ovaries (there are often only 5.)
17. A phalanx of stamens, outside view.
18. The same, inside view.
19. An anther cell burst.
20. The hard woody funicle at the base of the seed, this fits into the pits shown along the ventral suture in figures 9 and 10; there are 2 rows of these pits separated by the gaping mouth of the follicle after dehiscence.



Sterculia Haynei (Bedd.)

HEMIGYROSA DEFICIENS. (Nat. order Sapindaceæ.)

For Gen. Char. see letter press to Plate cli.

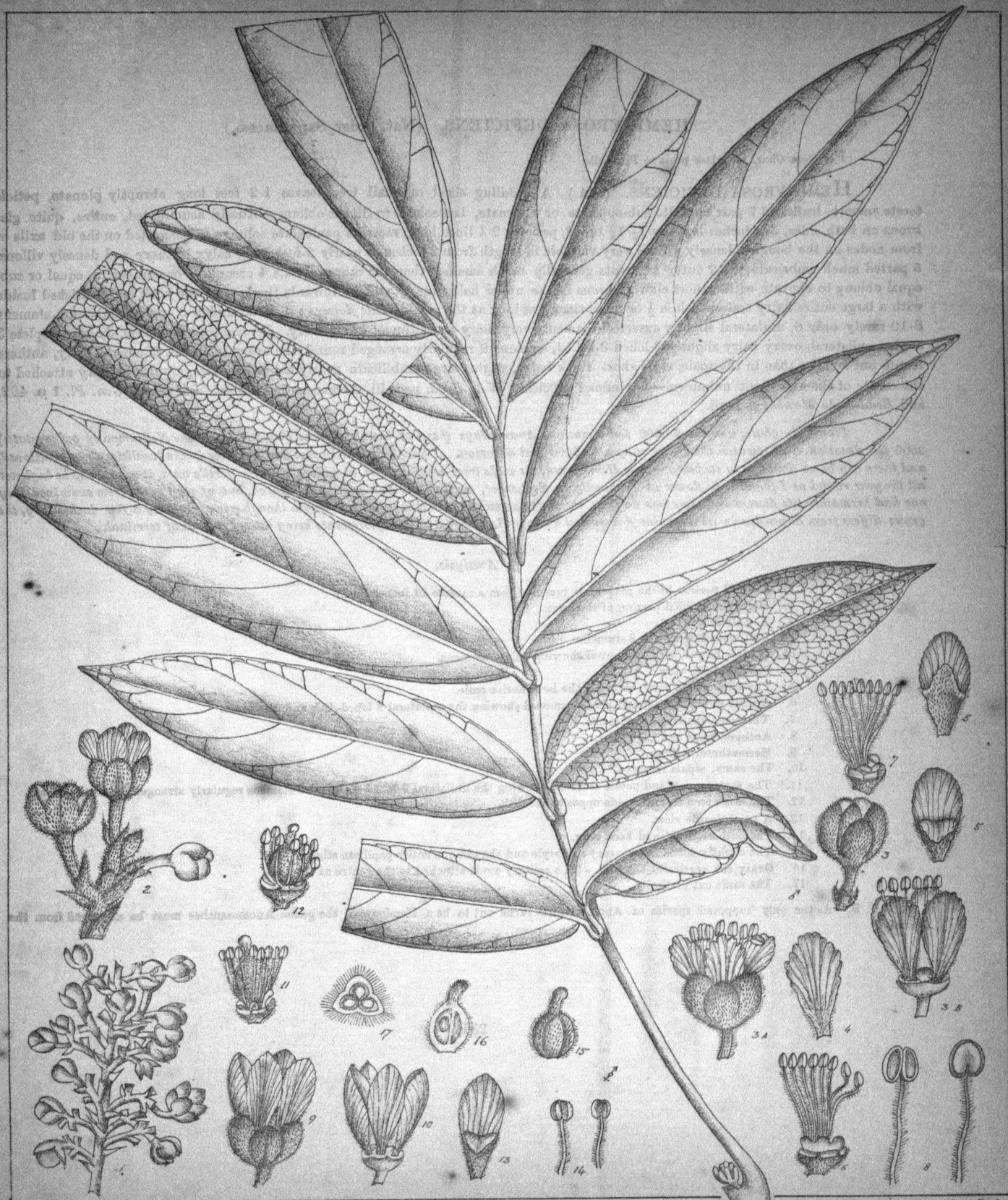
HEMIGYROSA DEFICIENS. (WA.) A middling sized or small tree, leaves 1-2 feet long abruptly pinnate, petiole terete smooth, leaflets 5-7 pair opposite sub-opposite or alternate, lanceolate to linear-oblong obtusely acuminated, entire, quite glabrous on both sides, 5-9 inches long by 1¼-1¾ broad, petioles 2-4 lines long, racemes panlculate solitary or congested on the old axils or from nodes on the boughs, densely villous very variable in length from 2 inches to nearly 2 feet long, calyx leathery and densely villous, 5 parted much imbricate the 2 outer segments generally much smaller than the others, petals 4 crenulate or sub entire equal or subequal oblong to obovate with a short claw glabrous in the upper half densely villous towards the base at the back and furnished inside with a large entire hairy scale which is ½ or more than ½ as long as the petal. *Male flowers* : disk incomplete 3 angled unilateral, stamens 8-10 rarely only 6, unilateral slightly exserted, filaments very hairy no rudiment of an ovary. *Hermathrodite flowers*, disk incomplete 3 angled unilateral, ovary hairy slightly 3-lobed 3-celled, stamens 8 regularly arranged round the ovary included, filaments hairy, anthers fertile but smaller than in the male, style short thick hairy, stigma large umbilicate nearly entire papillose, ovules solitary attached to the centre of the axis, fruit unknown.—Sapindus ? deficiens, *WA. Prod. page* iii. Anomosanthes, *Benth. and Hook. Gen. Pl.* 1 *p.* 402, and *Bedd.* vide *Manual p.* lxxii.

Tinnevelly ghats, common 2-4000 *feet elevation. Anamallays (head of the ghat from Palghat up to the Nelliampatty coffee estates)* 2500 *feet elevation, and towards the higher ranges at* 5000 *feet elevation. I have only lately met with this tree in the localities above mentioned, and there can be no doubt as to its being a true Hemigyrosa, the male trees are far more abundant than the fertile ones, it appears to be in flower all the year round as I found it in flower in Tinnevelly in September, and on the Anamallays in March, but of very many trees examined only one had hermathrodite flowers and there was no fruit, the male racemes are sometimes of great length though generally only a few inches long, the genus differs from Sapindus in its irregular flowers and unilateral disk and in its inflorescence being lateral instead of terminal.*

Analysis.

1. A small portion of the paniculate raceme (from a raceme 18 inches long.)
2. Highly magnified portion of the same.
3. A male flower bud.
3a. Full male flower with 8 stamens.
3b. A male flower, sepals removed showing only 6 stamens.
4. Petal, outside view.
5. The same inside view, showing the large entire scale.
6. A male flower, sepals and petals removed showing the unilateral 3 lobed-disk and 8 stamens.
7. The same showing 10 stamens.
8. Anthers, front and back view.
9. Hermathrodite flower.
10. The same, sepals removed.
11. The same, sepals and petals removed showing the unilateral 3-lobed disk and 8 stamens regularly arranged round the ovary.
12. The same seen from the side opposite the disk.
13. A petal, inside view.
14. The anthers, front and back view.
15. The slightly lobed hairy ovary and style and the oblique entire papillose stigma.
16. Ovary cut vertically the cells with a solitary ovule attached to the centre of the axis.
17. The same cut vertically.

N. B.—As the only supposed species of Anomosanthes turns out to be a Hemigyrosa, the genus Anomosanthes must be expunged from the Manual.



Grevedo del. Dempsey Lith.

Homogyne deficiens, Wh.

SEMECARPUS TRAVANCORICA. (Nat. order Anacardiaceæ.)

For Gen. Char. see letter press to Plate clxvi.

SEMECARPUS TRAVANCORICA. (Bedd.) A very large tree, leaves glabrous oblong rounded at the apex, or occasionally lanceolate and terminating in a fine point, very coriaceous, dark green and very shining above paler beneath, generally about a foot long by 5-6 inches broad, (but on young trees up to 2½ feet in length,) petioles about 2 inches long, veins and reticulated veinlets very prominent particularly beneath, panicles axillary and terminal about as long as the leaves spreading and compound, flowers 5-6 merous the calyx slightly puberulous and ciliate, the male with a large turbinate rudiment of an ovary, drupe obliquely oblong rounded at the apex about 1 inch long, hypocarp broad and short.

This is an exceedingly handsome tree on account of its shining dark green foliage, it is very common in the moist forests on the Tinnevelly and Travancore mountains (elevation 1000-3000 feet), it abounds with the same caustic black juice as S. anacardium, it flowers in August and September and ripens its fruit in the cold season, it is called in Tamil Natu Shengote.

Analysis.

1. A 5-merous male flower bud.
2. The same expanded.
3. The same petals removed, showing the turbinate rudiment of an ovary and the insertion of the stamens.
4. Anthers, front and back view.
5. A 6-merous male flower.
6. Portion of a panicle in fruit (drawn from a dried specimen.)
7. Seed.
8. Vertical section of the same.
9. Transverse section of the same.

The following species has lately been discovered on the Tinnevelly mountains by Mr. Hayne and should be added to the Manual at page lxxxi.

14. SEMECARPUS AURICULATA. (Bedd.) A good sized tree, leaves oblanceolate with a small blunt acumination very gradually attenuated at the base and there furnished with 2 rounded lobes just above the petiole, glabrous of a dull green color, costa slightly rusty, margin membranaceous, about 7 inches long by 1¾ broad above the middle, venation prominent beneath, petiole 2-3 lines long, drupe obliquely obovate about 6 lines broad by 4-5 lines high supported on a short broad cup-like hypocarp.

Simon del. Dunsby lith.

Semecarpus Travancorica. (Bedd.)

SOLENOCARPUS INDICA. (Nat. order Anacardiaceæ.)

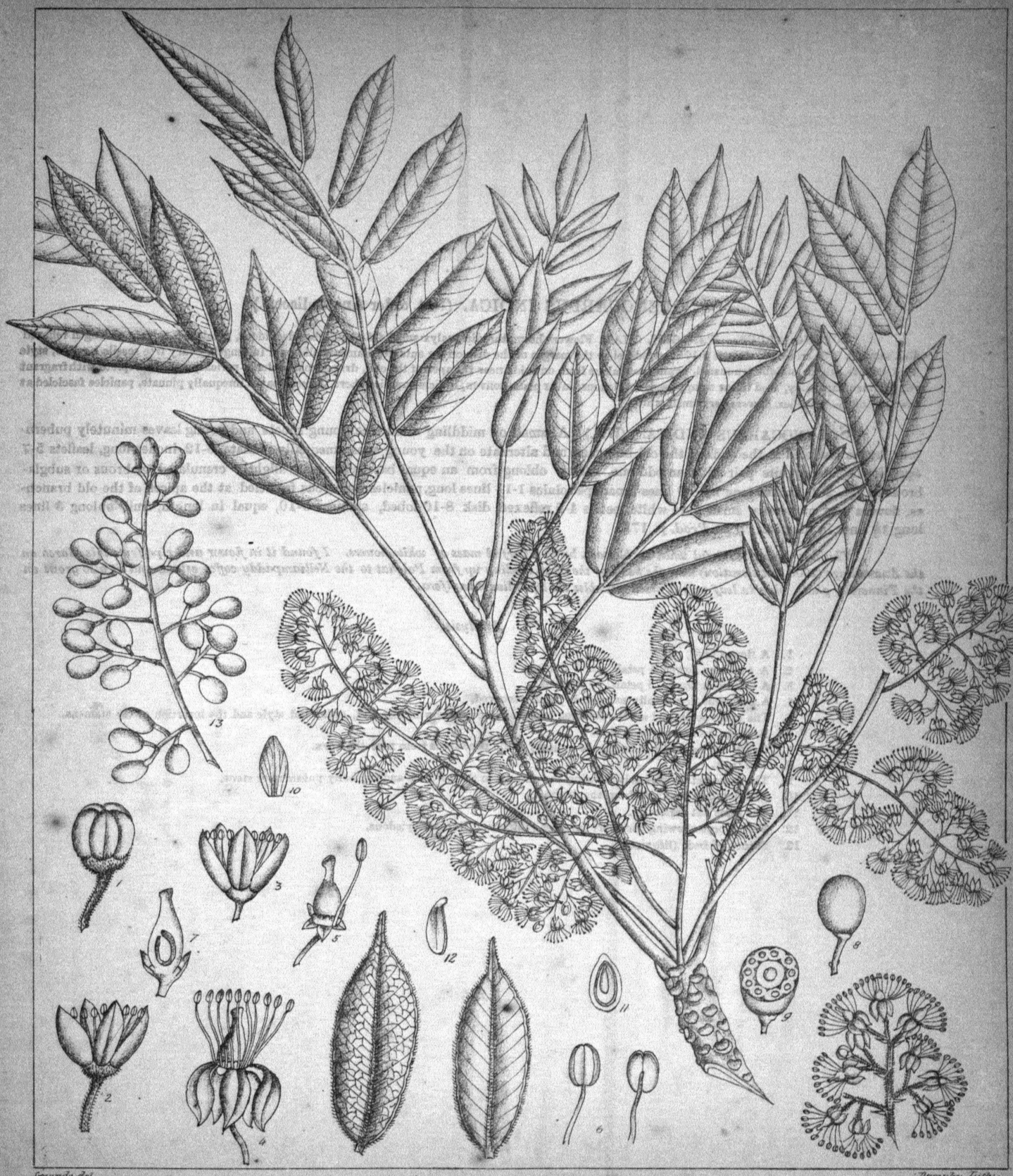
SOLENOCARPUS. *WA.*—GEN. CHAR. Flowers hermathrodite, calyx small 4-5 cleft, lobes deciduous, petals 4-5 valvate at length reflexed disk annular 8-10 crenated, stamen 8-10 inserted below the margin of the disk on the outside, filaments all equal in length, ovary free sessile 1 celled, style thick clavate, stigma oblique truncated, ovules pendulous from one side near the apex of the cell, drupe small oblong, pericarp cellular replete with fragrant oil, putamen hard bony, seed linear compressed, cotyledons linear plano-convex, radicle superior short. A tree, leaves unequally pinnate, panicles fascicled at the apex of the branches, flowers very small white.

SOLENOCARPUS INDICA. (WA.) A small or middling sized tree young shoots and young leaves minutely puberulous, leaves fascicled at the ends of the old branches and alternate on the young ones, unequally pinnate, 6-12 inches long, leaflets 5-7 opposite or sub-opposite pair with an odd one, narrow oblong from an equal base, acuminate slightly crenulated glabrous or subglabrous in age, 2-2½ inches long by 8-9 lines broad, petiolules 1-1½ lines long, panicles numerous fascicled at the apices of the old branches, flowers very numerous small pure white, petals 4-5 reflexed, disk 8-10-lobed, stamens 8-10, equal in length, fruit oblong 3 lines long 1½ lines in diameter. *WA. Prod. p.* 171.

This tree is very beautiful when in blossom, being a perfect mass of white flowers. I found it in flower and ripe fruit this March on the Anamallays (2600 *feet elevation*) *near the head of the ghat leading up from Palghat to the Nelliampaddy coffee estates and it also grows on the Tinnevelly ghats, when in leaf only it much resembles the Spondias mangifera.*

Analysis.

1. A flower bud.
2. A 4-merous flower, 4 petals and 8 stamens.
3. A 5-merous flower, 5 petals, 10 stamens.
4. A 5-merous flower fully expanded, petals recurved.
5. The same petals and all the stamens but one removed showing the disk, ovary and style and the insertion of the stamens.
6. Anthers, front and back view.
7. Ovary cut vertically showing the solitary ovule pendulous from near the apex.
8. The fruit.
9. The same cut transversely showing the oil-cells in the pericarp and the bony putamen or stone.
10. The putamen removed from the drupe.
11. The same cut vertically.
12. The embryo showing the short superior radicle and linear cotyledons.
13. Branch of fruit (life-size.)



Gowindo del. Dempsey Lith.

Solenocarpus Indica (Wh.)

MYRSINE CAPITELLATA. (Nat. order Myrsineæ.)

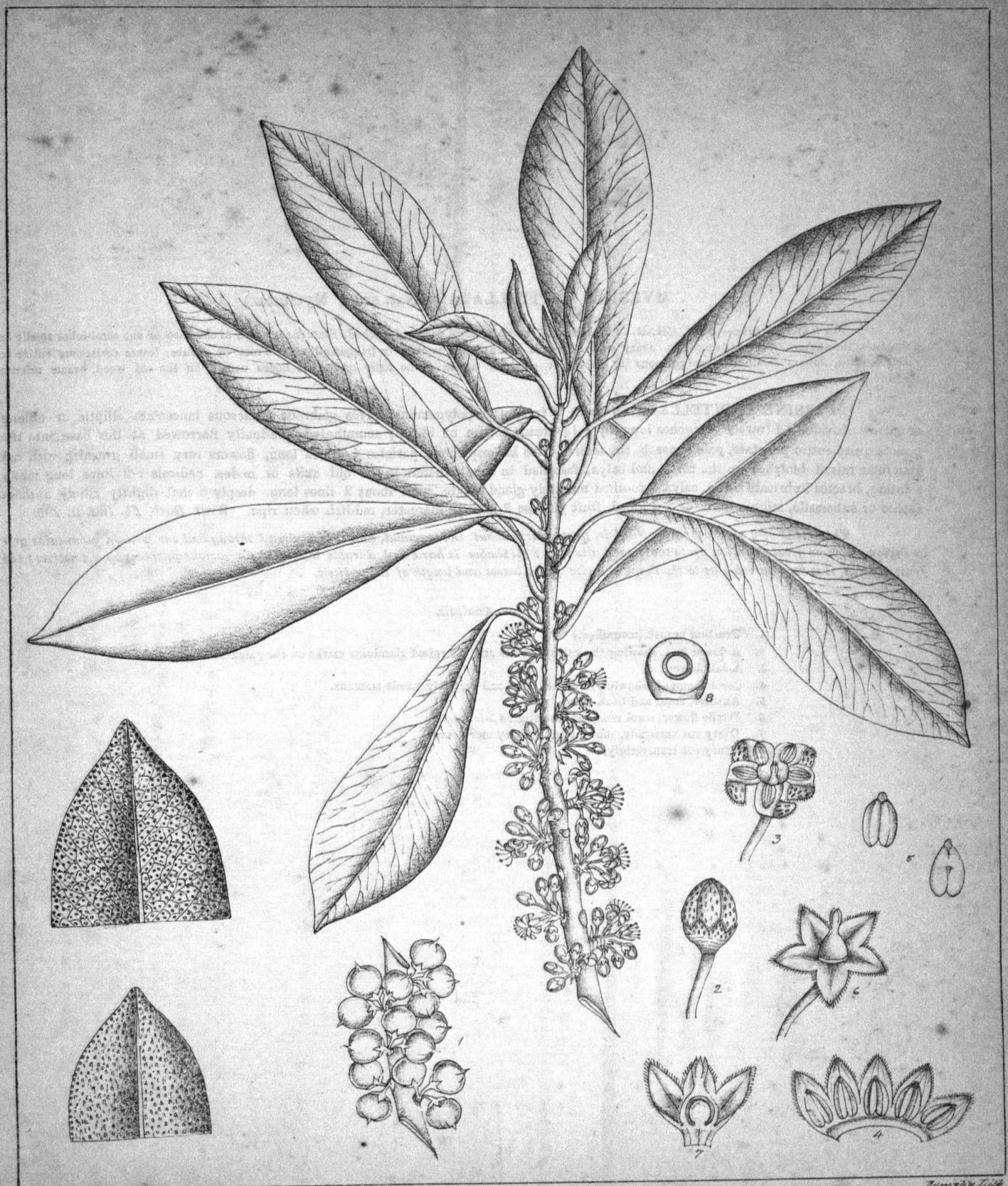
MYRSINE *Linn*—GEN. CHAR Calyx free 4-5 toothed, corol deeply 4-5 lobed. Stamens inserted at the base of the corol lobes sessile or subsessile, the anthers erect and lanceolate, ovary superior, style short with a capitate or fringed stigma. Trees or shrubs, leaves coriaceous entire or rarely toothed, flowers small often polygamous in umbels or clusters, sessile in the axils or at the nodes usually on the old wood, bracts minute deciduous.

MYRSINE CAPITELLATA. (Wall.) A tree, often polygamous, leaves glabrous coriaceous lanceolate elliptic or oblong or narrow obovate 3-4 (rarely 7) inches long by ¾-1¼ broad, obtuse or bluntly acuminated, gradually narrowed at the base into the petiole quite entire punctate, pale beneath, the lateral veins inconspicuous, petioles 4-6 lines long, flowers very small greenish with red glandular raised blotches on the corol and calyx, fascicled in small clusters in the old axils or nodes, pedicels 1-2 lines long rarely wanting, bractes imbricate ovate, calyx 5 toothed minutely gland ciliate, corol about 2 lines long, deeply 5 cleft slightly ciliate, anthers sessile or subsessile, stigma blunt or 2-3 lobed, fruit globose 2 lines in diameter, reddish when ripe. *Wall. Roxb. Fl. Ind.* ii. 295.

This tree is very common on the Nilgiris, particularly about Ootacamund, and is also found throughout our western mountains and in Ceylon from no great elevation up to the highest altitudes; its timber is hard and durable and used for various purposes by the natives; the fruit is eaten, it is very variable as to the shape and size of the leaves and length of the pedicels.

Analysis.

1. Fruiting branch (magnified.)
2. A flower bud, showing the valvate petals and the raised glandular marks on the calyx and corol.
3. A full flower.
4. Corol removed, showing its ciliate lobes and perfectly sessile stamens.
5. Anthers, front and back view.
6. Fertile flower, corol removed, the stigma 3-lobed.
7. Ovary cut vertically, showing the solitary erect ovule.
8. Ovary cut transversely.



Gerundo del. Humphry Lith.

Myrsine capitellata (Wall.)

ACHRAS ELENGIOIDES. (Nat. order Sapotaceæ.)

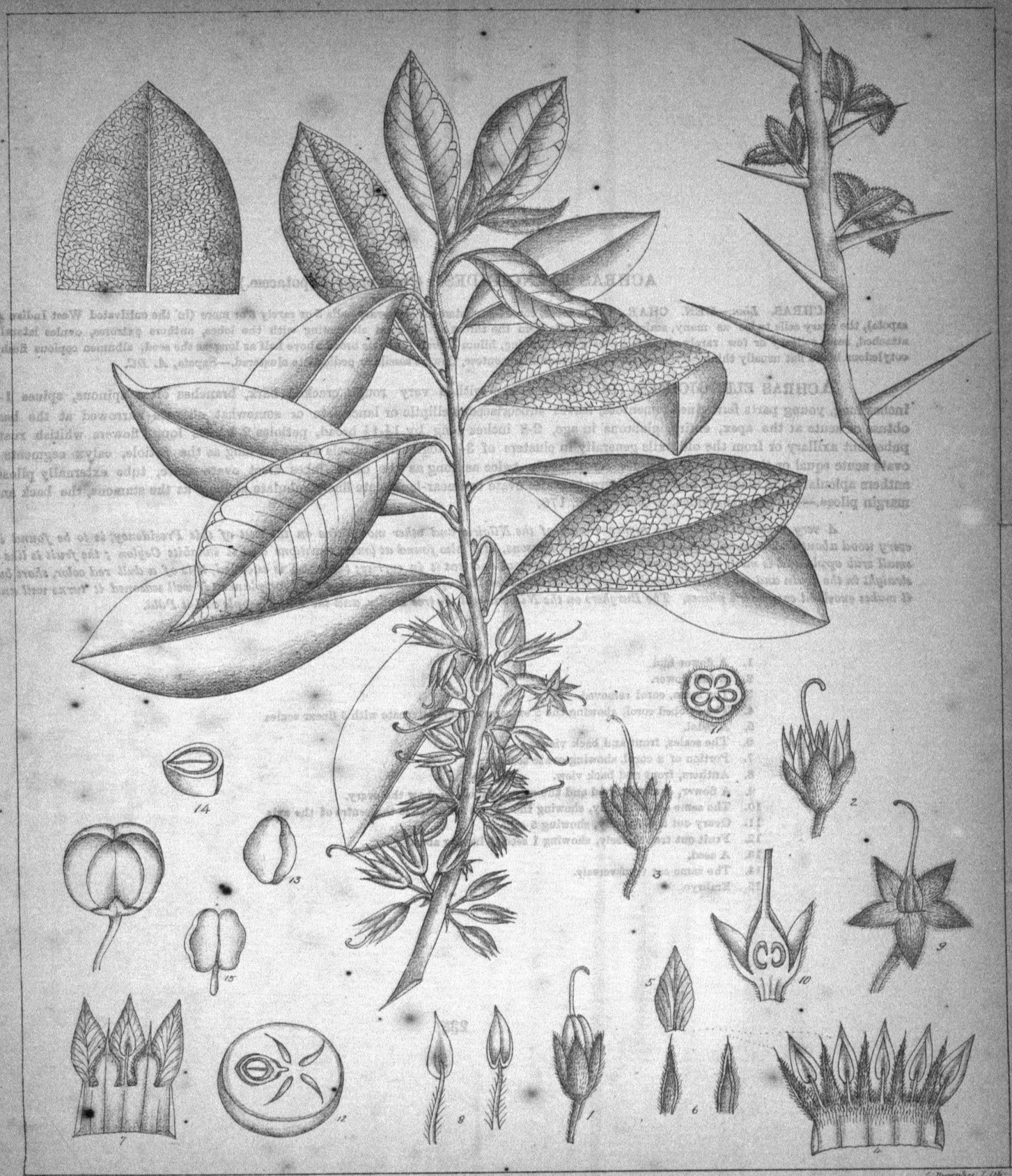
ACHRAS. *Linn.*—GEN. CHAR. Calyx lobes, corol lobes, stamens and ovary cells 5 or rarely 6 or more (in the cultivated West Indian A. sapota), the ovary cells twice as many, scales (or staminodia?) in the throat of the corol alternating with the lobes, anthers extrorse, ovules laterally attached, seeds solitary or few rarely all perfect; testa hard shining, hilum lateral linear or broad above half as long as the seed, albumen copious fleshy, cotyledons broad flat usually thin. Trees or shrubs, glabrous or tomentose, flowers sessile or pedicellate clustered.—Sapota, *A. DC.*

ACHRAS ELENGIOIDES. (DC.) A large tree with a very rough cracked bark, branches often spinous, spines 1-2 inches long, young parts ferrugineo-tomentose, leaves subcoriaceous elliptic or lanceolate or somewhat obovate narrowed at the base obtuse or acute at the apex, entire, glabrous in age, 2-3 inches long by 1¼-1½ broad, petioles 2-4 lines long, flowers whitish rusty pubescent axillary or from the old axils generally in clusters of 3-4 together, pedicels about as long as the petiole, calyx segments 5 ovate acute equal or the exterior 3 broader, corol nearly twice as long as the calyx, lobes erect ovate acute, tube externally pilose, anthers apiculate, the filaments hairy, the alternate scales ovate to linear-lanceolate finely subulate as long as the stamens, the back and margin pilose.—Sapota elengioides, *DC. Prod.* 8, 176.

A very common tree on the higher ranges of the Nilgiris and other mountains on the west of this Presidency, is to be found in every wood about Ootacamund in flower and fruit at all seasons, it is also found at lower elevations and it inhabits Ceylon ; the fruit is like a small crab apple and is made into pickles, and the natives cook and eat it in curries; the wood is esteemed, it is of a dull red color, short but straight in the grain and very dense, it makes good beams for houses, but splits too much to be used for planks ; if well seasoned it turns well and it makes excellent carpenter's planes. The Burghers on the Nilgiris call the tree Holay, and the Tamil people call it Pàlà.

Analysis.

1. A flower bud.
2. A full flower.
3. The same, corol removed.
4. The 5-lobed corol, showing the 5 extrorse anthers alternate with 5 linear scales.
5. A petal.
6. The scales, front and back view.
7. Portion of a corol, showing ovate scales.
8. Anthers, front and back view.
9. A flower, corol removed and the calyx opened, to show the ovary.
10. The same cut vertically, showing the ovules attached to the centre of the axis.
11. Ovary cut transversely, showing 5 cells.
12. Fruit cut transversely, showing 1 seed, 5 having aborted.
13. A seed.
14. The same cut transversely.
15. Embryo.



Gourlie del.

C. Humphrey Lith.

Achras elengioides (D.C.)

CHRYSOPHYLLUM ROXBURGHII. (Nat. order Sapotaceæ.)

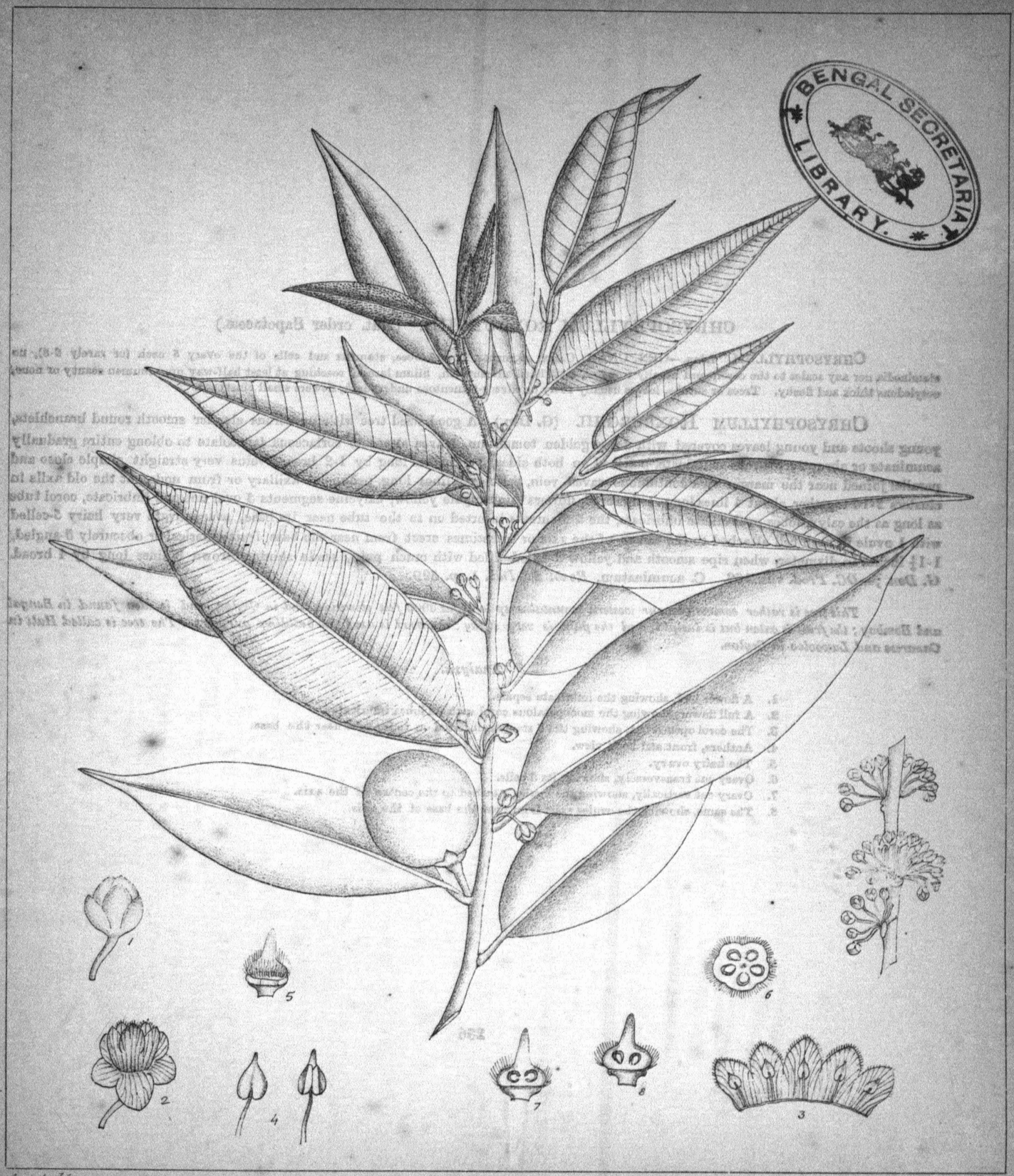
CHRYSOPHYLLUM. *Linn.*—GEN. CHAR. Calyx segments, corol lobes, stamens and cells of the ovary 5 each (or rarely 6-8), no staminodia nor any scales to the corol, seed usually 1 or few, testa hard and smooth, hilum lateral reaching at least half-way up, albumen scanty or none, cotyledons thick and fleshy. Trees or shrubs, leaves usually rusty or silvery-tomentose underneath, flowers small clustered.

CHRYSOPHYLLUM ROXBURGHII. (G. Don.) A good sized tree with numerous slender smooth round branchlets, young shoots and young leaves covered with dense golden tomentum, leaves alternate coriaceous lanceolate to oblong entire gradually acuminate or abruptly rostrato-acuminate, polished on both sides, 3-7 inches long by 1-2 broad, veins very straight simple close and parallel joined near the margin by a continuous waved vein, petioles 3 lines long, peduncles axillary or from nodes at the old axils in clusters 2-15 together, about 4 lines long, 1-flowered, flowers minute pale yellow, calycine segments 5 oval unequal imbricate, corol tube as long as the calyx, lobes oval ciliate imbricate, the 5 filaments inserted on to the tube near its base, ovary ovate very hairy 5-celled with 1 ovule in each cell attached to the centre of the axis or sometimes erect from near the base, fruit spherical or obscurely 5-angled, 1-1¼ inches in diameter, when ripe smooth and yellow 5-celled filled with much pulp, seeds shining brown 8 lines long by 4 broad. *G. Don.*;—*DC. Prod.* viii. 162. C. acuminatum, *Roxb. Fl. Ind.* 1. *p.* 599.

This tree is rather common on our western mountains up to about 3000 *feet elevation, and in Ceylon, and is also found in Bengal and Bombay; the fruit is eaten but is insipid, and the pulp is very sticky; the wood is used for building purposes. The tree is called Hali in Canarese and Lawooloo in Ceylon.*

Analysis.

1. A flower bud, showing the imbricate sepals.
2. A full flower, showing the monopetalous corol with its lobes imbricate.
3. The corol opened out, showing the 5 stamens inserted on to its tube near the base.
4. Anthers, front and back view.
5. The hairy ovary.
6. Ovary cut transversely, showing its 5 cells.
7. Ovary cut vertically, showing the ovules attached to the centre of the axis.
8. The same, showing the ovules erect from near the base of the axis.



BENGAL SECRETARIAT LIBRARY.

Comrade, del. Dampsey, Lith.

Chrysophyllum Roxburghii (G. Don.)

SYMPLOCOS GARDNERIANA. (Nat. order Styraceæ.)

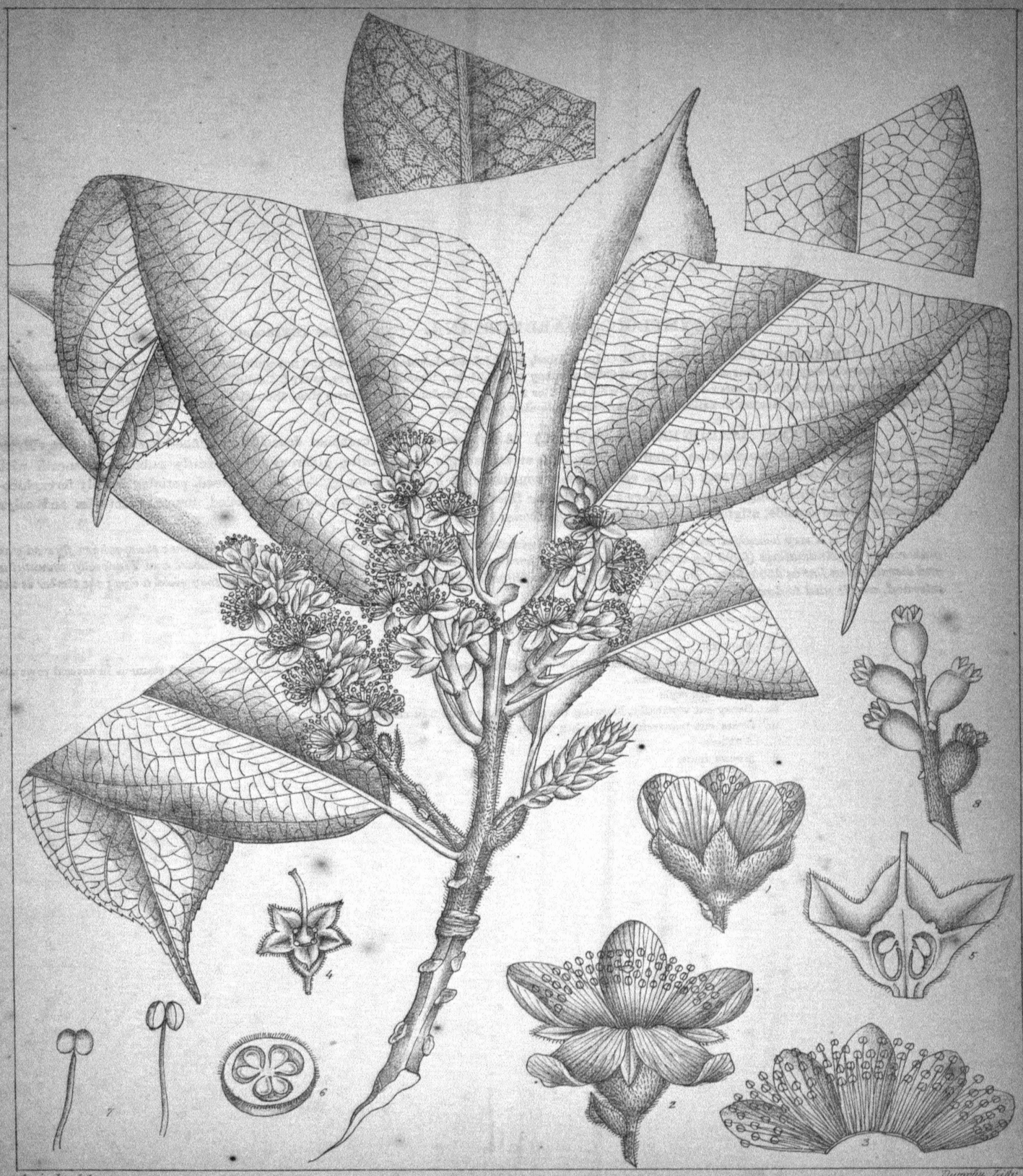
SYMPLOCOS. *Linn.*—GEN. CHAR. Calyx 5 lobed, corol lobes imbricate in the bud and not contorted, the petals sometimes almost free, stamens generally very numerous always more than twice as many as corol-lobes, filaments filiform, ovary 2-5 celled with 2 or rarely 3 ovules in each cell, fruit a berry crowned with the calyx-lobes, usually with only 1 or 2 seeds, cotyledons much shorter than the radicle. Trees or shrubs, the foliage often turning yellow in drying, flowers in axillary simple or branched spikes or racemes.

SYMPLOCOS GARDNERIANA. (Wight.) A large tree, young branches densely ferrugineo-tomentose, leaves elliptic acute or with a longish acumination, minutely denticulate at the margin or subentire, glabrous above, softly pubescent beneath with very prominent costa and primary pinnate veins densely tomentose, 4-7 inches long by 2-3 inches broad, petioles densely ferrugineo-tomentose 10-12 lines long, racemes axillary much shorter than the leaves tomentose, flowers crowded, bracts, bracteoles and calyx tomentose on the outside, stigma large capitate. *Wight Icones* 1231.

This is a very beautiful tree when in flower, and decidedly the finest of our numerous species of the genus; the specimen figured was gathered on the Anamallays (6000 feet elevation), and I also have specimens from different parts of the Travancore and Tinnevelly mountains and elevations as low as 4500 feet. Dr. Wight found it on the Nilgiris; the leaves turn yellow in drying, and they yield a dye; the timber is not esteemed, and is said to decay very rapidly.

Analysis.

1, 2. Flower.
3. Corol removed, showing the 5 lobes slightly joined at the base and the very numerous unequal stamens in several rows attached to its base.
4. Calyx and style.
5. Ovary cut vertically, showing the pendulous ovules 2 in each cell.
6. Ovary cut transversely, showing that it is 3 celled.
7. Anthers.
8. Young fruit.



Grewinck del. Dumphy Lith.

Symplocos Gardneriana, Wight

OLEA GLANDULIFERA. (Nat. order Jasmineæ.)

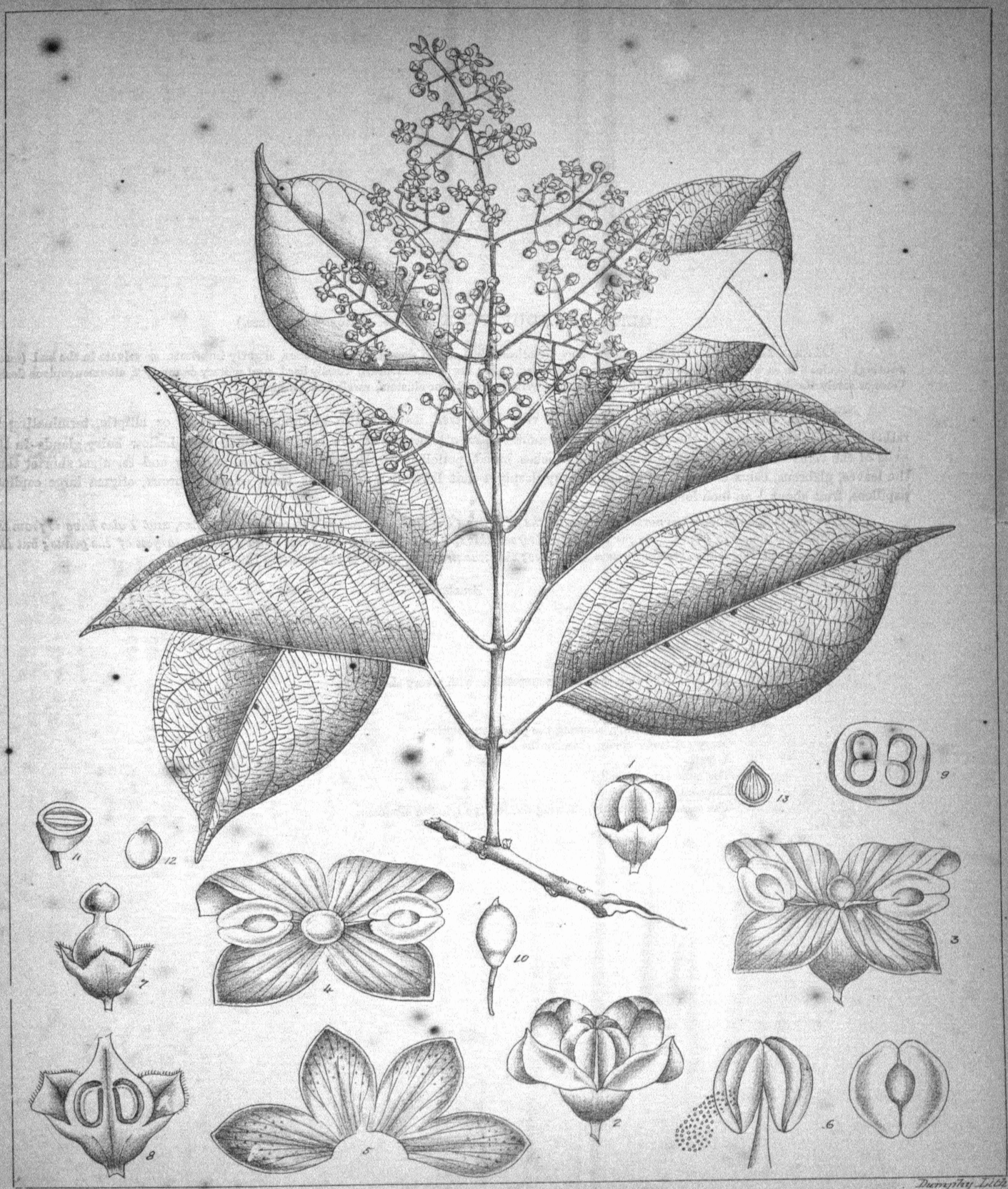
OLEA. *Linn.*—GEN. CHAR. Calyx short 4-toothed, corol with a short tube and 4 lobes, slightly imbricate or valvate in the bud (rarely wanting), ovules 2 in each cell of the ovary pendulous, style short, fruit a drupe the endocarp usually hard, seed solitary or rarely 2, albumen copious fleshy. Trees or rarely shrubs, leaves opposite entire, flowers small in axillary panicles or clusters, rarely also terminal.

OLEA GLANDULIFERA. (Wall.) A very large tree, leaves entire glabrous oval, ovate, or elliptic, terminating in rather a sudden acumination at the apex, rounded or more or less attenuated at the base, furnished with hollow hairy glands in the axils of the veins beneath, 4-5 inches long by 2-2¼ inches broad, petiole 6-10 lines long, panicles axillary and terminal shorter than the leaves, glabrous, calyx ciliate, corol glandular very deeply 4-cleft leaving a very short tube, ovary glabrous, stigma large capitate papillose, fruit about ½ an inch long.

This tree is abundant on the northern slopes of the Nilgiris (Ouchterlony's valley), elevation 4-5000 *feet, and I also have it from the Anamallays, and it is found in Nepal. As far as I have observed this species, it is a very large tree and by far the largest of the genus; but Dr. Wight found it in woods about the Avalanche as a small tree; this was probably owing to the elevation* (6000 *feet.*)

Analysis.

1. A flower bud.
2. A flower opening.
3. A full flower.
4. The corol and stamens removed.
5. The corol, showing that it is monopetalous with a very short tube.
6. Anthers.
7. Ovary, style and stigma.
8. Ovary cut vertically, showing the pendulous ovules.
9. Ovary cut transversely, showing the 2 cells.
10. A fruit.
11. The same cut vertically.
12. The seed.
13. The same cut vertically, showing the embryo lying in albumen.



Olea glandulifera (Wall.)

CHIONANTHUS INTERMEDIA. (Nat. order Jasmineæ.)

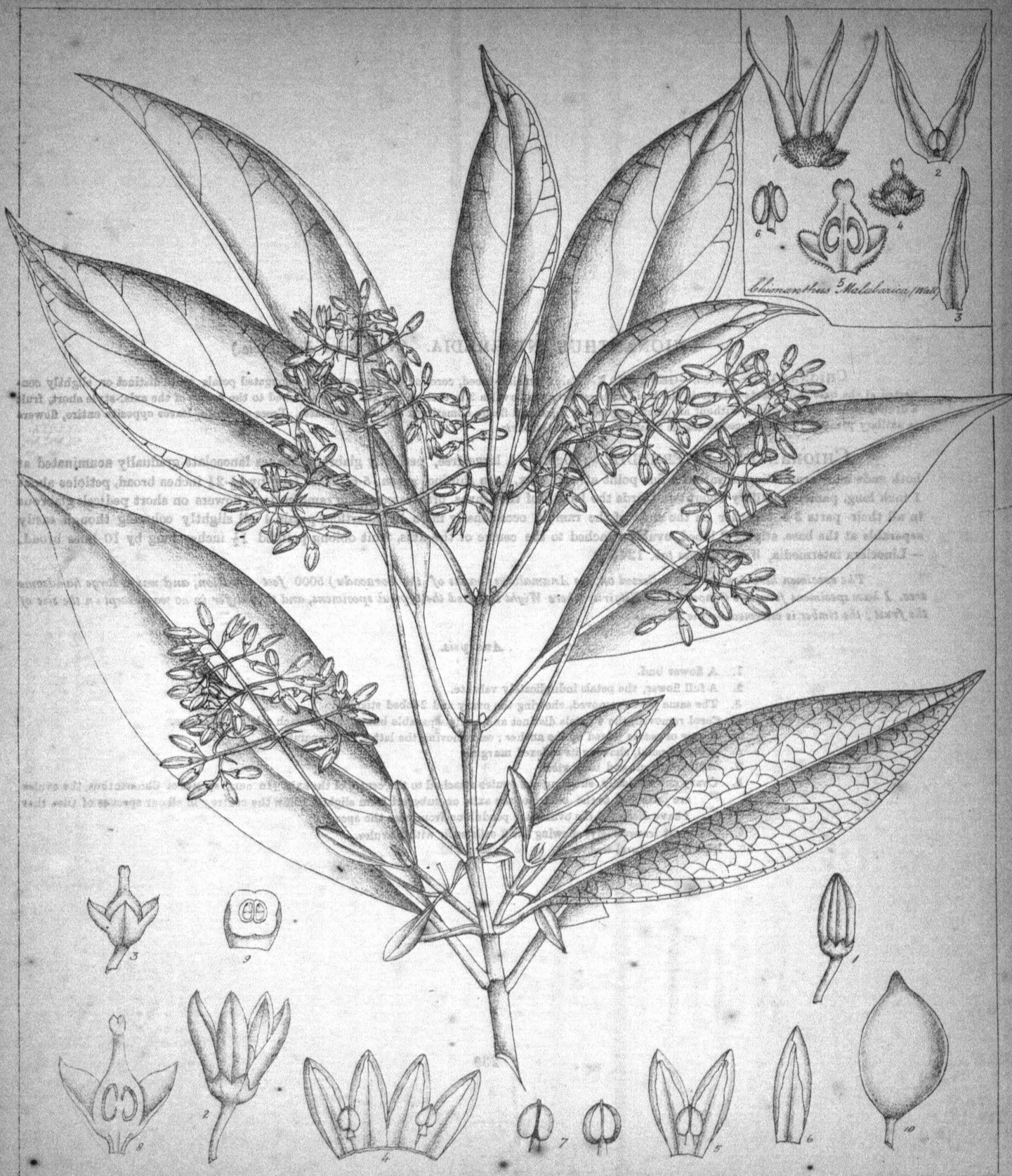
CHIONANTHUS. *Linn.*—GEN. CHAR. Calyx small 4-lobed, corol of 4 narrow small or elongated petals quite distinct or slightly connected at the base induplicate-valvate in the bud, anthers extrorse, ovules 2 in each cell of the ovary attached to the centre of the axis, style short, fruit a drupe, seeds usually solitary without albumen, cotyledons thick and fleshy sometimes slightly ruminate. Trees or shrubs, leaves opposite entire, flowers in axillary panicles rarely reduced to sessile clusters.—Linociera, *Swartz.*

CHIONANTHUS INTERMEDIA. (Wight.) A large tree, perfectly glabrous, leaves lanceolate gradually acuminated at both ends and terminating in rather a fine point at the apex, deep shining green, 5-6 inches long by 1½-2½ inches broad, petioles about 1 inch long, panicles axillary about two-thirds the length of the leaves, bracteated at the ramifications, flowers on short pedicels glabrous in all their parts 3-5 together on the ends of the ramuli, occasionally male by abortion, petals 4 all slightly cohering though easily separable at the base, stigma 2 lobed, ovules attached to the centre of the axis, fruit oblong pointed 1½ inches long by 10 lines broad. —Linociera intermedia, *Wight Icones tab.* 1245.

The specimen here figured was collected on the Anamallays (banks of the Toracadu) 5000 feet elevation, and was a large handsome tree. I have specimens from the Conoor ghat, Nilgiris, where Wight collected the typical specimens, and they differ in no way except in the size of the fruit; the timber is esteemed by the natives.

Analysis.

1. A flower bud.
2. A full flower, the petals induplicately valvate.
3. The same petals removed, showing the ovary and 2-lobed stigma.
4. Corol removed, the 4 petals distinct and easily separable but adnate to each other at the base.
5. A pair of petals joined by the anther; on removing the latter they separate.
6. A single petal, showing its inflexed margins.
7. Anthers, front and back view.
8. Ovary cut vertically, showing the ovules attached to the centre of the axis. [In our 3 species of Chionanthus, the ovules are attached to the centre of the axis, or suberect from slightly below the centre; in all our species of Olea that I have dissected the ovules are pendulous from near the apex.]
9. Ovary cut transversely, showing the 2 cells each with 2 ovules.
10. Ripe fruit, natural size.



Chionanthus intermedia (Wight)

NYCTANTHES ARBOR-TRISTIS. (Nat. order Jasmineæ.)

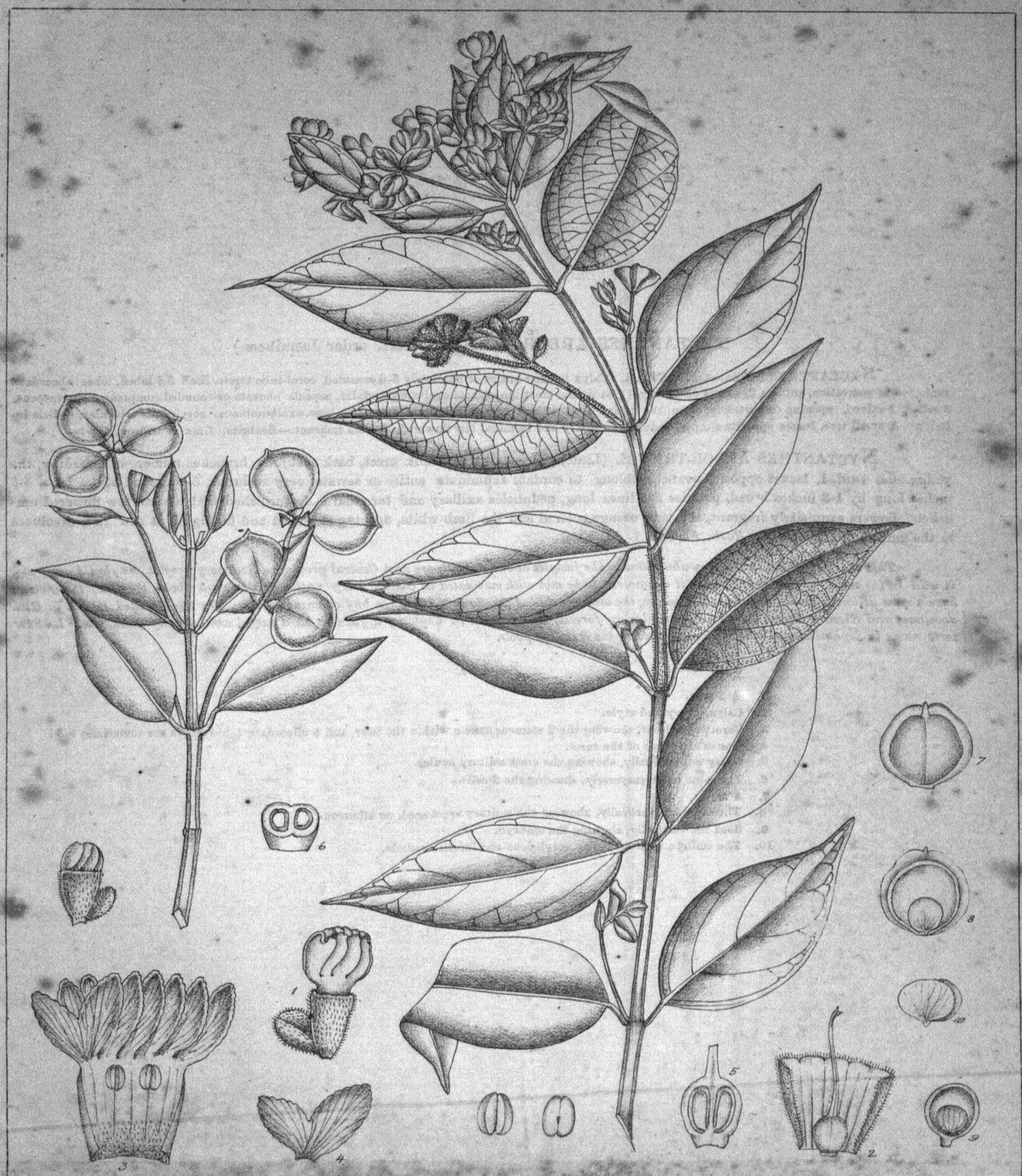
NYCTANTHES. *Juss.*—GEN. CHAR. Calyx tubular entire or obsoletely 5-6 crenated, corol-tube terete, limb 5-8 lobed, lobes obcordate contorted in æstivation, anthers 2, sessile on the corol just within the tube, stigma capitate glandular, capsule obovate or rounded compressed chartaceous, 2-celled, 2-valved, opening transversely from the apex, seed solitary in each cell erect from the base exalbuminous, cotyledons orbicular, radicle inferior. A small tree, leaves opposite simple, peduncles axillary and terminal few flowered, flowers fragrant.—Scabrita, *Linn.* Parilium, *Gærtn.*

NYCTANTHES ARBOR-TRISTIS. (Linn.) A small tree, trunk erect, bark scabrous, branches numerous spreading, the young ones 4-sided, leaves opposite ovate or oblong to cordate acuminate entire or serrate, very scabrous, 3-5 nerved at the base, 3-5 inches long by 1-3 inches broad, petioles 2-5 lines long, peduncles axillary and terminal leafy furnished with several few-flowered umbellets, flowers exquisitely fragrant, the tube orange colored and the limb white, opening at sunset and falling off at sun rise, involucre to the umbellets 2-6 leaved. *Roxb. Fl. Ind.* 1. 86.

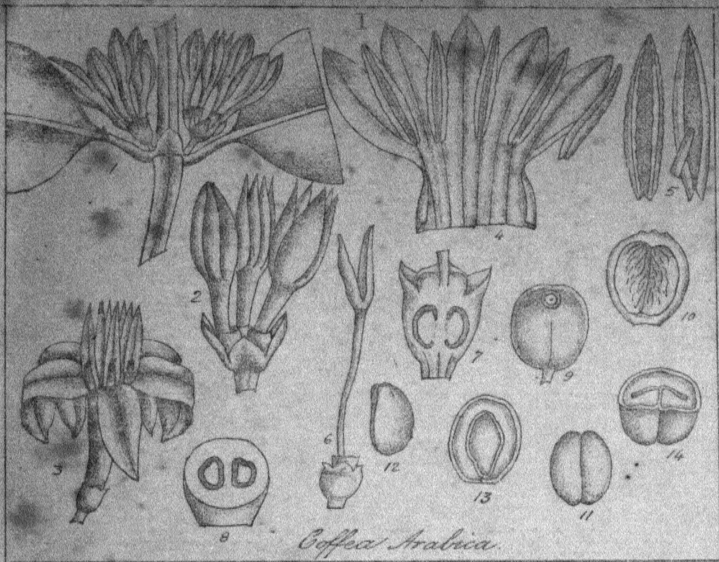
This charming little tree is very abundant in the jungles about Jubbulpore and Central provinces, Godavery jungles, &c., but I never saw it wild in the south of this Presidency ; it is however to be met with cultivated in almost every native garden, and about temples ; the flowers have a most delicious smell, somewhat like honey, the orange tubes of the flowers dye a fine buff or orange color. The tree is called Bàrjàt in Hindoostanee and Kirsàru by the Gonds in the Godavery forests, and Sepala in Ceylon ; it yields a hard useful wood, but of small size. Its Sanserit name is Sephalica, and it is often mentioned by the Sanscrit poets.

Analysis.

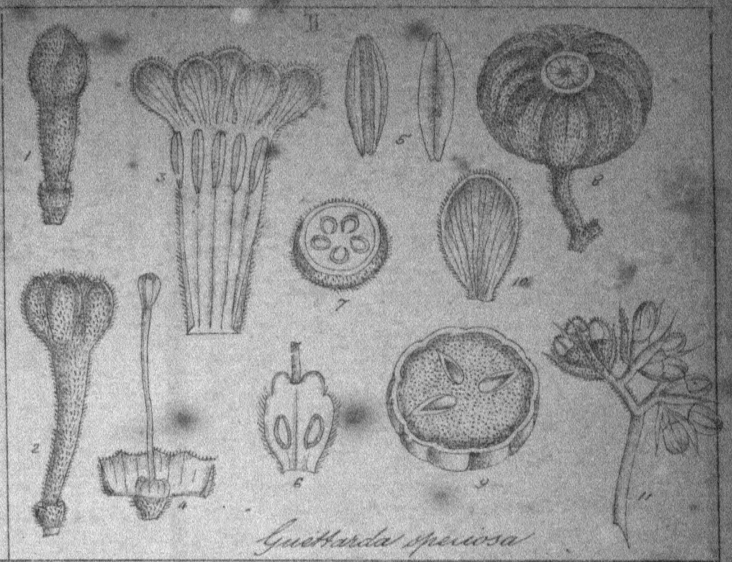
1. A flower.
2. Calyx, ovary and style.
3. Corol opened out, showing the 2 stamens sessile within the tube, and 6 obcordate lobes (there are sometimes 5-8.)
4. One of the lobes of the corol.
5. Ovary cut vertically, showing the erect solitary ovules.
6. The same cut transversely, showing the 2 cells.
7. A fruit.
8. The same cut vertically, showing the solitary erect seed, no albumen.
9. Seed cut vertically, showing the embryo.
10. The embryo with orbicular cotyledons and inferior radicle.



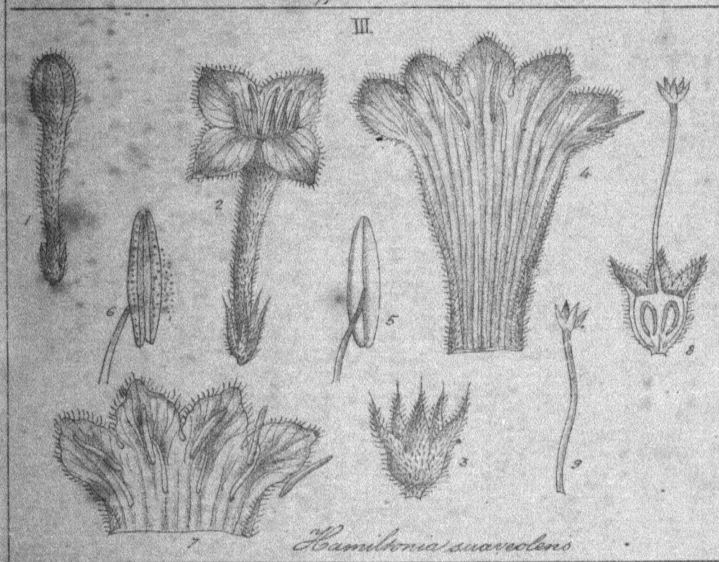
Nyctanthes arbor-tristis (Linn)



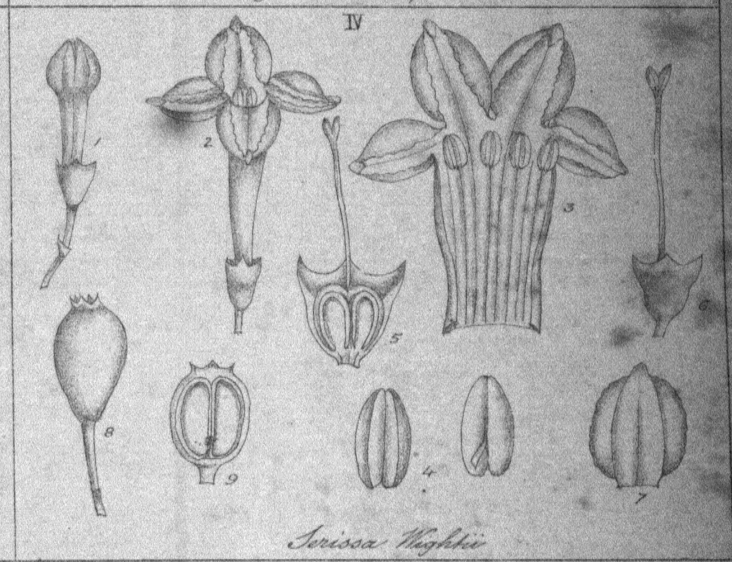
Coffea Arabica.



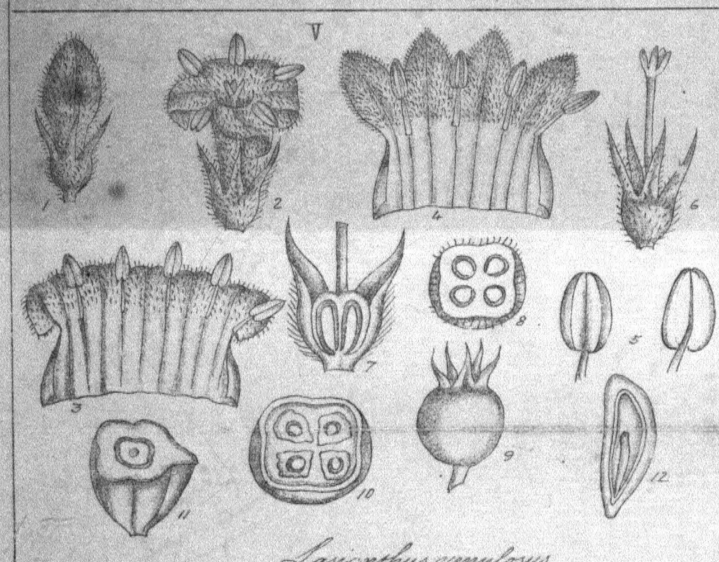
Guettarda speciosa.



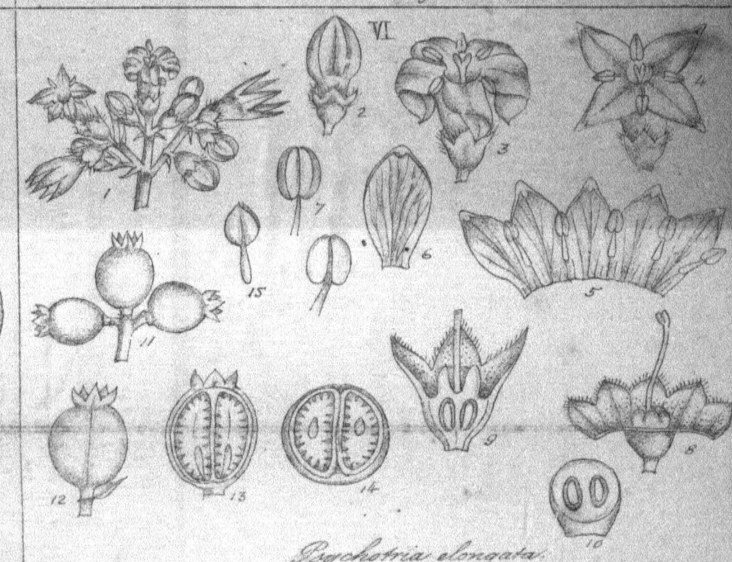
Hamiltonia suaveolens.



Serissa Wightii.

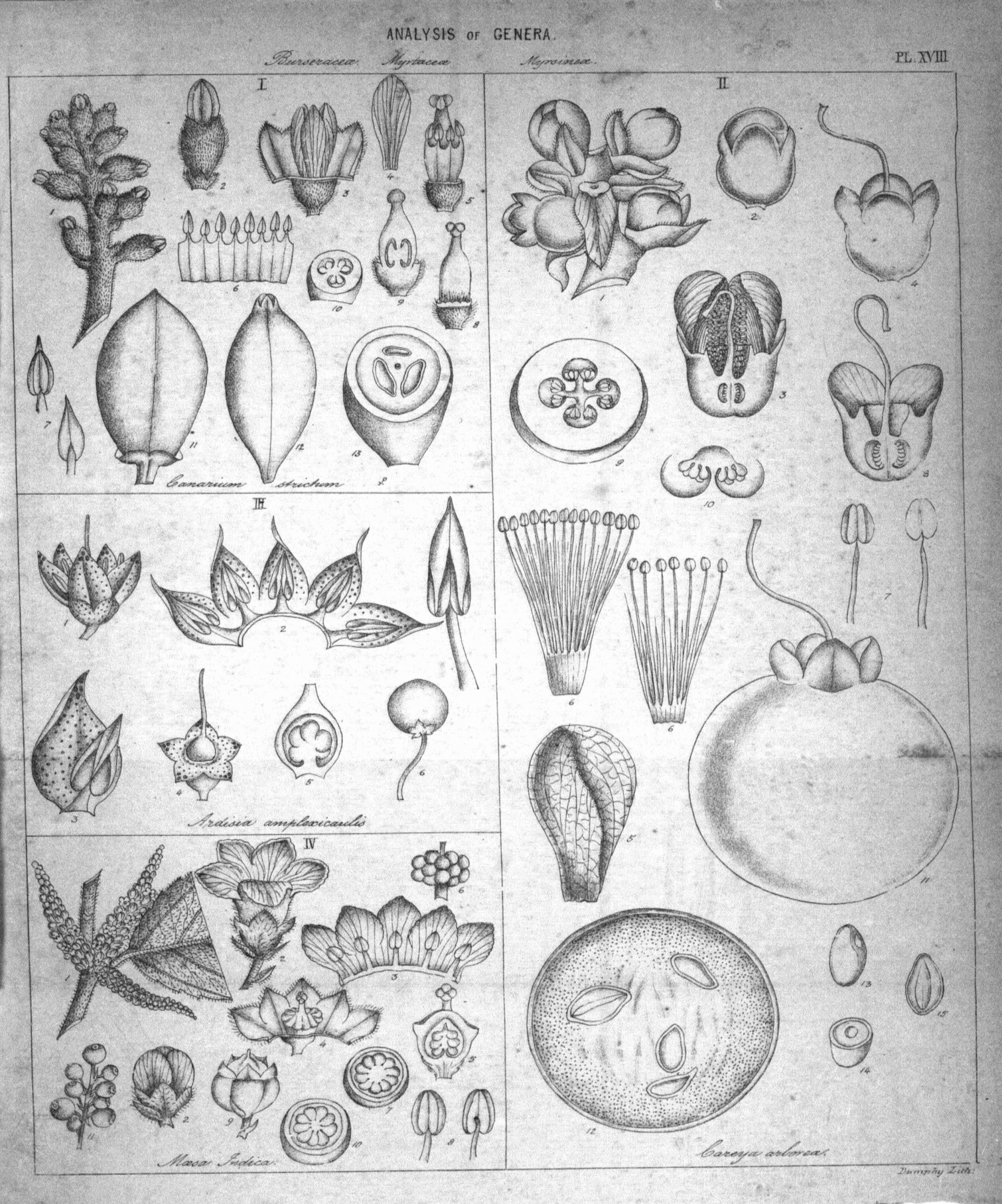


Lasianthus cerulosus.



Psychotria elongata.

Dunsby del. et lith.


I.
Canarium strictum
II.
Careya arborea
III.
Ardisia amplexicaulis
IV.
Mesua Indica.
Dunphy Lith.

WRIGHTEA TINCTORIA. (Nat. order Apocyneæ.)

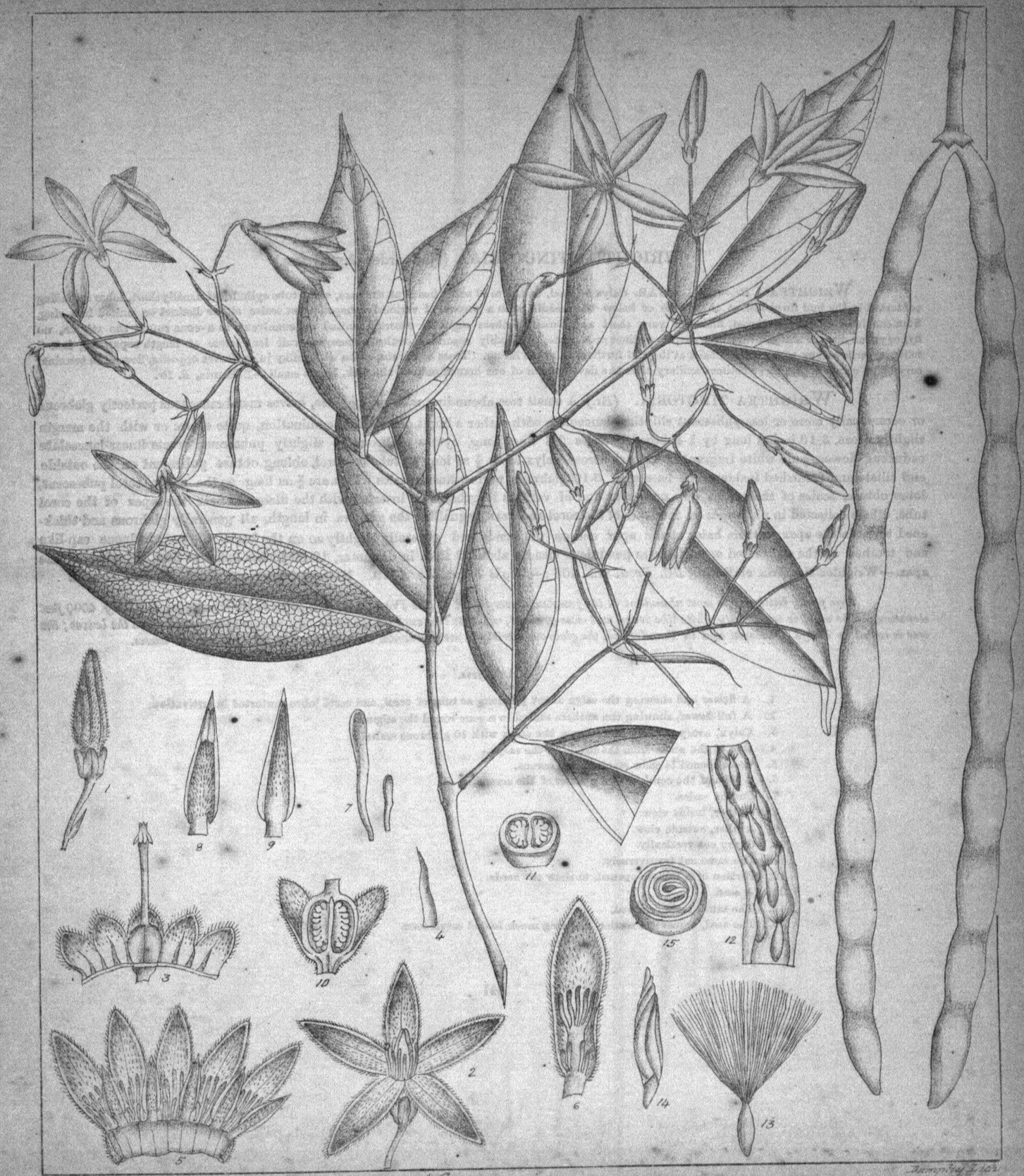
WRIGHTEA. *Br.*—GEN. CHAR Calyx 5-lobed, with 5 to 10 scales inside at the base, corol-tube cylindrical usually short, lobes spreading contorted in the bud furnished at their base or below the middle with a corona of variously shaped erect scales either distinct or united in a ring. Stamens inserted in the throat, filaments very short and broad, anthers sagittate exserted united or connivent in a cone round the stigma, no hypogynous disk or scales, ovary of 2 carpels distinct or connate, but readily separable, ovules numerous, fruit long terete at length separating into 2 follicles, seeds oblong with a tuft of hairs at the end furthest from the hilum. Trees or shrubs, often with milky juice, leaves opposite, flowers in terminal corymbose cymes appearing sometimes axillary after the development of one branch only of the fork, bracts small.—Balfouria, *R. Br.*

WRIGHTEA TINCTORIA. (Br.) A small tree abounding with milky juice, leaves membranaceous perfectly glabrous or occasionally more or less pubescent elliptical-lanceolate with rather a blunt often long acumination, quite entire or with the margin slightly erose, 3-10 inches long by 1-4 broad, petioles 2-3 lines long, cymes glabrous or slightly pubescent, bracts linear-lanceolate caducous, flowers pure white fragrant, 1-1½ inch across, calyx-lobes ⅔ as long as tube of corol, oblong obtuse pubescent on the outside and ciliate and furnished inside at the base with 5-10 glabrous narrow linear scales which are ⅔ as long as the calyx, corol pubescent, lobes obtuse, scales of the corona very numerous and of various lengths, some inserted with the filaments near the apex of the corol tube, others collected in phalanges on the lobes of the corol and nearly equalling the anthers in length, all generally glabrous and thickened towards the apex, anthers hairy at the apex and on the inside and generally slightly so on the back, stigma glutinous cap-like and toothed at the contracted apex, follicles pendulous slender about 5 lines in diameter, 10-20 inches long, at first adhering at the apex.—Wrightea tinctoria et Rothii, *DC. Prod.* viii. 406;—*Wight Icones tab.* 1319. Nerium tinctorium, *Roxb. Fl. Ind.* ii. *p.* 4.

This pretty little tree is most abundant in the jungles in every part of this Presidency, and ascends the mountains to nearly 4000 *feet elevation. The wood is beautifully white like ivory and close-grained, and cuts like soap on the lathe. An indigo is extracted from the leaves; the tree is called in Telugu Tedlapàl and in Tamil Pàlà, the glabrous variety is more common than the variety with puberulous leaves.*

Analysis.

1. A flower bud showing the calyx about ⅔ as long as tube of corol, and corol lobes contorted in æstivation.
2. A full flower, showing the anthers united in a cone round the stigma.
3. Calyx, ovary and cap-like stigma, the calyx with 10 glabrous scales.
4. One of the scales from the inside of the calyx.
5. Corol opened to show stamens and corona.
6. A lobe of the corol, showing scales of the corona.
7. Corona scales.
8. Anther, inside view
9. Anther, outside view
10. Ovary cut vertically.
11. The same cut transversely.
12. Portion of a follicle opened, to show the seeds.
13. A seed.
14. The same, testa removed.
15. The seed, transverse section, showing much folded cotyledons.



Wrightsea Hirctoria. R.Br.

ALSTONIA SCHOLARIS. (Nat. order Apocyneæ.)

ALSTONIA. *R. Br.*—GEN. CHAR. Calyx without any or with very minute glands. Corolla-tube cylindrical, more or less swollen round the anthers, the lobes spreading, contorted in the bud, throat without scales. Anthers enclosed in the tube. No hypogynous scales. Ovary of 2 distinct carpels united by the style, stigma ovoid or conical; ovules numerous, in about 4 rows in each carpel. Fruit of 2 long linear follicles. Seeds oblong, compressed, peltately attached, bordered with hairs of which those at each end are usually very long; albumen scanty. Trees or tall shrubs with a milky juice. Leaves in whorls of 3 or more, or in a few species opposite. Flowers in terminal corymbose cymes, usually 1 in the axil of each leaf of the terminal whorl. Bracts small.—Blaberopus, *A. DC.*

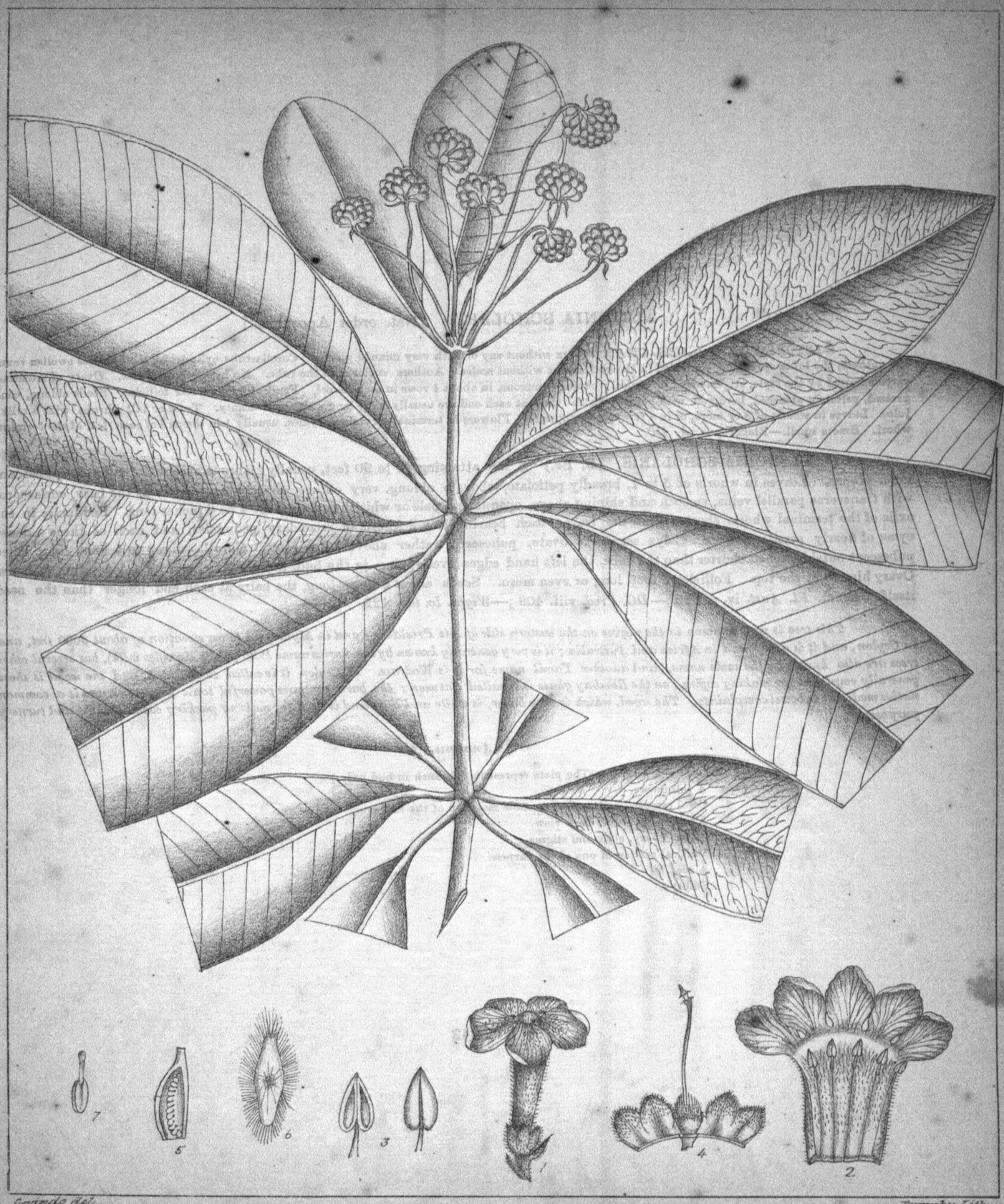
ALSTONIA SCHOLARIS. (R. Br.) A tree attaining 80 to 90 feet, usually glabrous except the minutely pubescent inflorescence. Leaves in whorls of 5 to 7, broadly petiolate, obovate oblong, very obtuse, shortly contracted at the base, coriaceous, with transverse parallel veins, smooth and shining above, opaque and pale or whitish underneath, 4 to 6 inches long. Peduncles in the axils of the terminal whorls shorter than the leaves, each bearing 1 or 2 whorls of secondary peduncles, and each of these a dense cyme of nearly sessile flowers. Calyx segments ovate, pubescent, rather above 1 line long. Corolla tube 3 to 4 lines long, lobes pubescent outside, much shorter than the tube, the left hand edges overlapping in the bud, the throat closed by a dense ring of hairs Ovary hirsute at the top. Follicles 1 foot long or even more. Seeds about 3 lines long, the hairs at each end longer than the seed itself. *Benth. Fl. Aust.* iv. *p.* 312;—*DC. Prod.* viii. 408;—*Wight. Ic. tab.* 422.

This tree is very common in the plains on the western side of this Presidency and in Mysore up to an elevation of about 3000 *feet, and in Ceylon, and it is also found in Africa and Australia; it is very generally known by the native name Pàlà (which signifies milk), but several other trees are also known by the same name, and another Tamil name for it is Wodrase. In Ceylon it is called Rookattana, and the wood is there generally employed for making coffins; on the Bombay ghats it is called Satween; the bark possesses powerful tonic properties, and is a common native medicine in bowel complaints. The wood, which is very bitter, is white and light and is used for making packing cases, sheaths and turnery purposes.*

Analysis.

(The plate represents a branch in bud only.)

1. A full flower.
2. Corol removed and opened to show insertion of the anthers.
3. Anthers, front and back view.
4. Calyx, ovary, style and stigma
5. Vertical section of one of the carpels.
6. A seed.
7. Embryo.



Corinde del. Dunphy Lith.

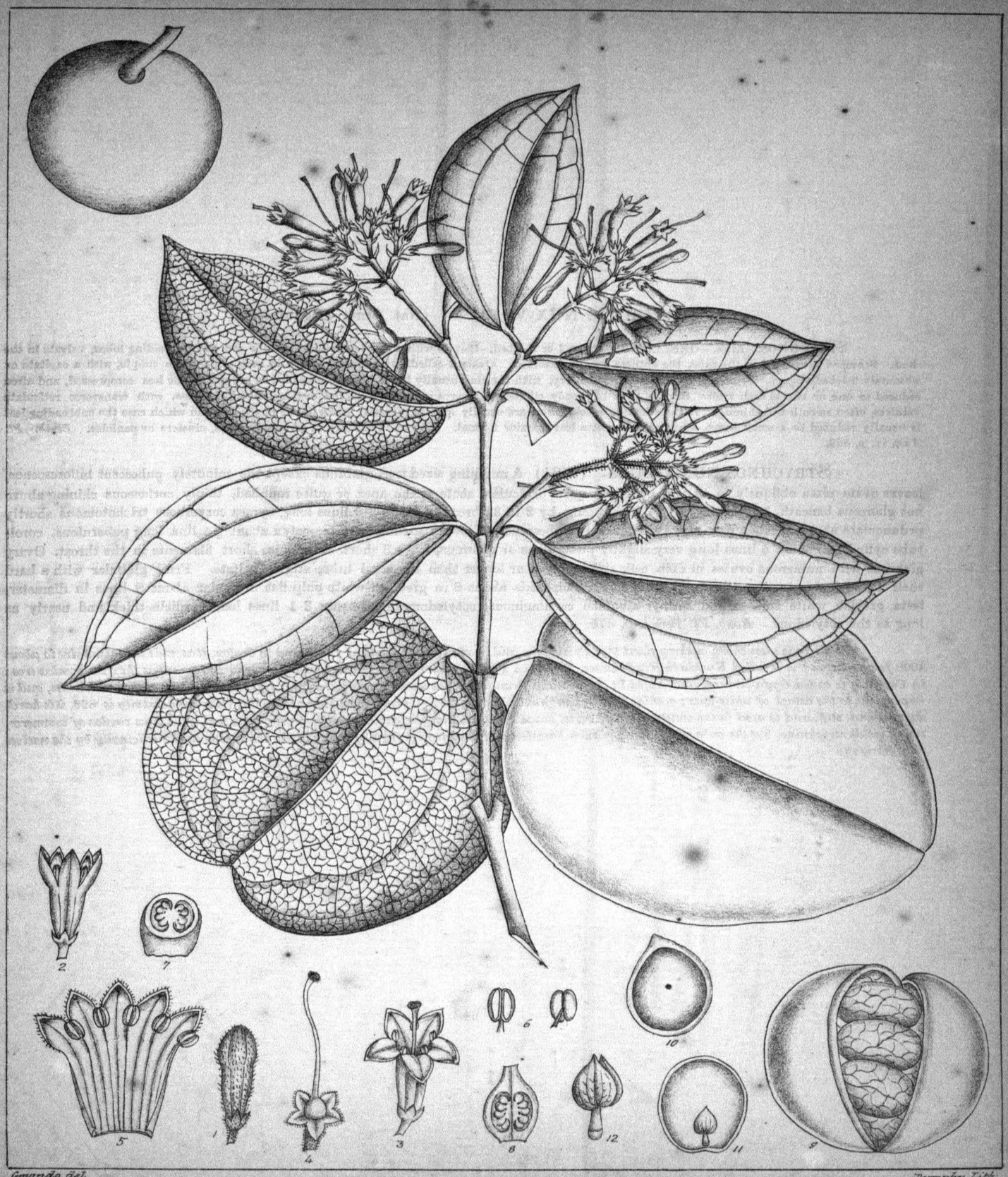
Alsomia scholaris (R. Br.)

STRYCHNOS NUX-VOMICA. (Nat. order Loganiaceæ.)

STRYCHNOS. *Linn.*—GEN. CHAR. Calyx 4-or 5-lobed. Corolla with a short or cylindrical tube and 4 or 5 spreading lobes, valvate in the bud. Stamens 5, inserted in the tube, the anthers usually exserted. Ovary 2-celled, with several ovules in each cell. Style simple, with a capitate or obscurely 2-lobed stigma. Fruit a globular indehiscent berry, with the rind usually hard. Seeds imbedded in pulp, more or less compressed, and often reduced to one or two in each fruit. Shrubs, trees or woody climbers. Leaves opposite, 3-nerved or 5-nerved at the base, with transverse reticulate veinlets, often smooth and shining. In the climbing species there are usually spirally recurved hooks in one of the axils, in which case the subtending leaf is usually reduced to a small bract, whilst the opposite leaf remains normal. Flowers in axillary or terminal cymes, clusters or panicles. *Benth. Fl. Aust.* iv. *p.* 368.

STRYCHNOS NUX-VOMICA. (Willd.) A middling sized tree, glabrous except the minutely pubescent inflorescence, leaves ovate often obliquely so to oval or nearly quite orbicular, acute at the apex or quite rounded, thinly coriaceous shining above not glaucous beneath, 3 to 5 nerved, 3-4 inches long by 2 to 3¼ broad, petioles 3-6 lines long, cymes corymbose trichotomous shortly pedunculate above the last pair of leaves minutely pubescent. Flowers greenish-white, calyx about ½ a line long puberulous, corol-tube cylindrical about 5 lines long very slightly puberulous or glabrous, lobes 5 short, anthers on short filaments in the throat. Ovary glabrous with numerous ovules in each cell, style as long or longer than the corol tube, stigma peltate. Fruit globular with a hard shell 1½·2¼ inches in diameter, bright orange colored, seeds about 6 in greenish-white pulp flat orbicular about 9 lines in diameter, testa greyish white smooth and satiny, albumen cartilaginous, cotyledons broad-ovate 3-4 lines long, radicle thick and nearly as long as the cotyledons. *Roxb. Fl. Ind.* i. *p.* 575.

This tree is most common throughout this Presidency and in many other parts of India and in Ceylon, it ascends the mountains to about 4000 feet elevation; it is called Kuchlà in Hindostanee, Mushti in Teligu, and Yetti in Tamil, and is known to Europeans as the Nux vomica tree; in Ceylon it is called Goda-kaduru, and Kàjrà in the Bombay Presidency; the wood is very bitter, of a light-brown color streaked with white, and is impervious to the attack of white-ants; a cubic foot unseasoned weighs about 70 lbs and when seasoned 56 lbs, its specific gravity is ·896, it is hard, durable and stiff, and is used in the construction of carts, house building, ploughs, cabinet purposes, &c.; the seed is the Nux vomica of commerce, which yields strychnine, but the pulp of the fruit is quite harmless and the favorite fruit of many birds, the root is used medicinally by the natives as a febrifuge.



Gerardo, del. Deamphry, Lith.

Strychnos nux-vomica (Willd.)

FAGRÆA COROMANDELINA. (Nat. order Loganiaceæ.)

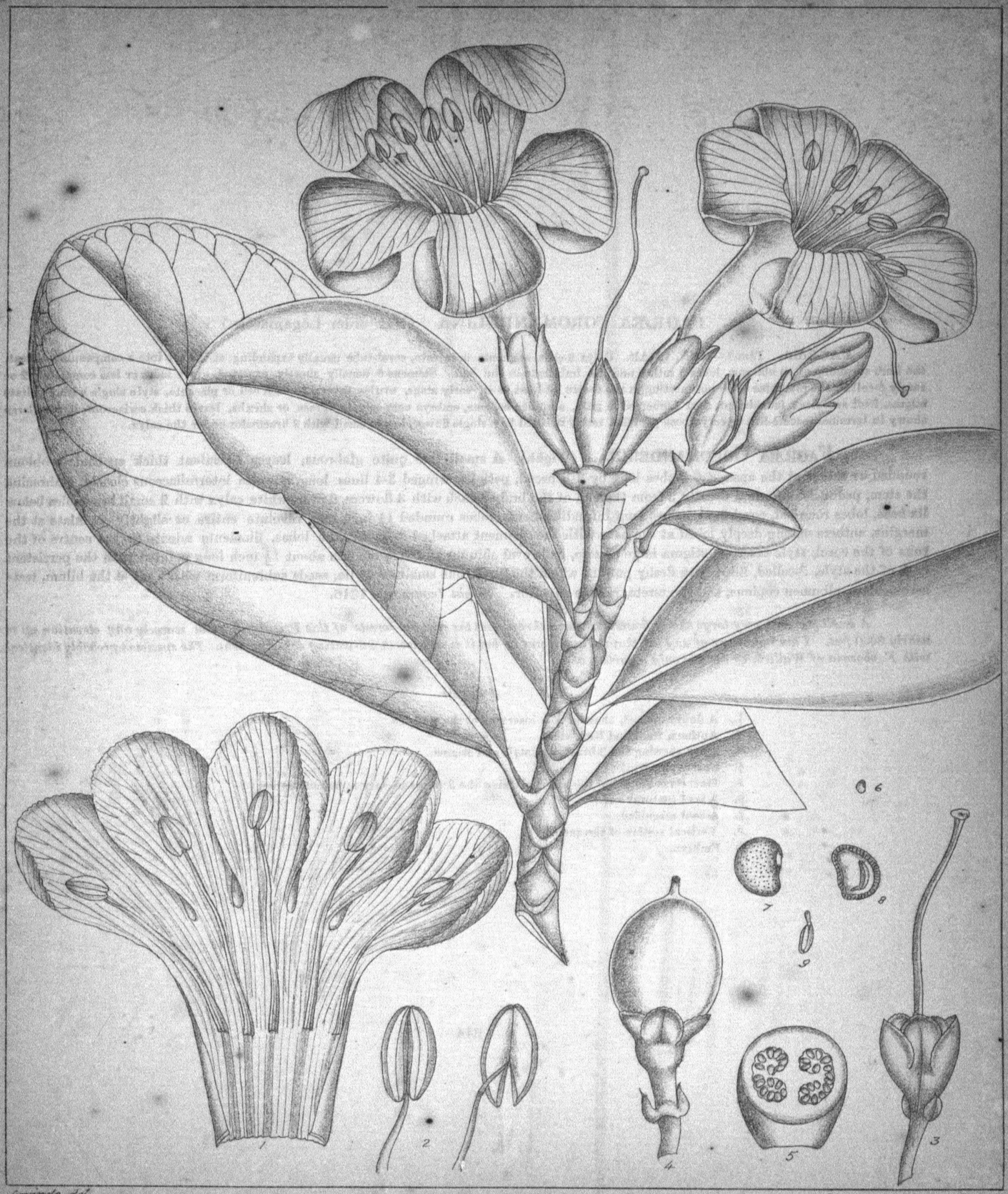
FAGRÆA. *Thunb.*—GEN. CHAR. Calyx 5-cleft, segments imbricate, corol-tube usually expanding at the top into a campanulate throat, the limb spreading often oblique, lobes 5 rather unequal imbricate in the bud. Stamens 5 usually shortly exserted, ovary more or less completely 2 or rarely 3-celled, the placentas often not meeting in the centre at least at an early stage, ovules several to each cell or placenta, style single with a peltate stigma, fruit succulent indehiscent, seed immersed in pulp, albumen copious, embryo very small. Trees or shrubs, leaves thick coriaceous, flowers large showy in terminal racome-like or corymbose panicles, rarely reduced to a single flower, bracts small with 2 bracteoles under the calyx.

FAGRÆA COROMANDELINA. (Wight.) A small tree quite glabrous, leaves succulent thick spathulato-oblong rounded or retuse at the apex, 4-6 inches long by 2-3 broad, petioles winged 3-4 lines long, stipules interfoliaceous closely embracing the stem, peduncles terminal usually 3 from the end of the branch each with 3 flowers, flowers white, calyx with 2 small bracteoles below its base, lobes rounded, corol 3-3½ inches long infundibuliform, lobes rounded 1⅓ inch long revolute entire or slightly crenulate at the margins, anthers oblong deeply lobed at the base with the filament attached between the lobes, filaments adnate to the centre of the tube of the corol, style exserted, stigma large peltate, fruit oval shining and very smooth about 1½ inch long pointed with the persistent base of the style, 2-celled, filled with fleshy pulp in which the numerous small seeds lie, seeds subreniform with a pit at the hilum, testa scrobiculate, albumen copious, embryo terete, radicle superior. *Wight Icones tab.* 1316.

A small tree with very large showy flowers, common throughout the western forests of this Presidency from scarcely any elevation up to nearly 6000 *feet. I am not aware of any use that the tree is put to, but it is well worth cultivating for ornament. The species is probably identical with F. obovata of Wallich, or at least only a variety of it.*

Analysis.

1. A flower opened, showing the insertion of the stamens.
2. Anthers, front and back view.
3. Calyx showing the 2 bracteoles, style and stigma.
4. Nearly ripe fruit.
5. Transverse section of the same, showing the 2 cells and very numerous seeds.
6. A seed (natural size.)
7. A seed magnified.
8. Vertical section of the same
9. Embryo.



Govindo. del.

Dempsey Lith.

Fagræa Coromandelina (Wight.)

CORDIA WALLICHII. (Nat. order Boragineæ.)

CORDIA. *Linn.*—GEN. CHAR. Calyx tubular or campanulate, 5 toothed or irregularly toothed or lobed. Corolla-tube cylindrical or funnel-shaped, the limb 5 or sometimes 6 or more-lobed. Stamens inserted in the tube, anthers included or exserted. Ovary entire, 4 celled, with 1 pendulous or laterally attached ovule in each cell, style terminal, twice forked. Fruit a drupe, the endocarp hard, with 4 cells or fewer by abortion. Seeds without albumen; testa thin; cotyledons longitudinally folded; radicle superior. Trees or shrubs, glabrous scabrous-pubescent or villous. Leaves entire or toothed. Flowers in cymes, sometimes contracted into heads, at first terminal, but often becoming lateral by the growth of the branch. Bracts small or none.

CORDIA WALLICHII. (G. Don.) A good sized tree, leaves from broad-ovate or orbicular to cordate often more or less repand, rounded or slightly pointed at the apex, 4-5 inches each way, glabrous or subglabrous above (the veins sometimes slightly hairy) densely woolly beneath, 3-5 nerved at the base, petioles 1-1½ inches long, flowers polygamous about 6 lines in expansion in loose pedunculate terminal cymes or panicles, calyx ovate 5-toothed densely albo-villous towards the apex, closed over the corol in the bud, hardened cup-shaped and irregularly toothed in fruit. Corol 5-lobed, lobes revolute, tube hairy within, anthers much exserted oblong sagittate at the base, style twice forked as in the genus, ovules attached to the centre of the axis, drupe ovoid or globular the pulp viscid. *G. Don Gen. Syst.* 4 *p.* 379. C. tomentosa, *Wall. in Roxb. Fl. Ind.* (*ed. Wall.*) *vol.* 11, *p.* 339.

This tree is tolerably common throughout our western forests and in Mysore and the Bombay Presidency; technically it is hardly distinct from the common Cordia myxa, but the densely woolly leaves well distinguish it. The timber is serviceable and in use with the natives.

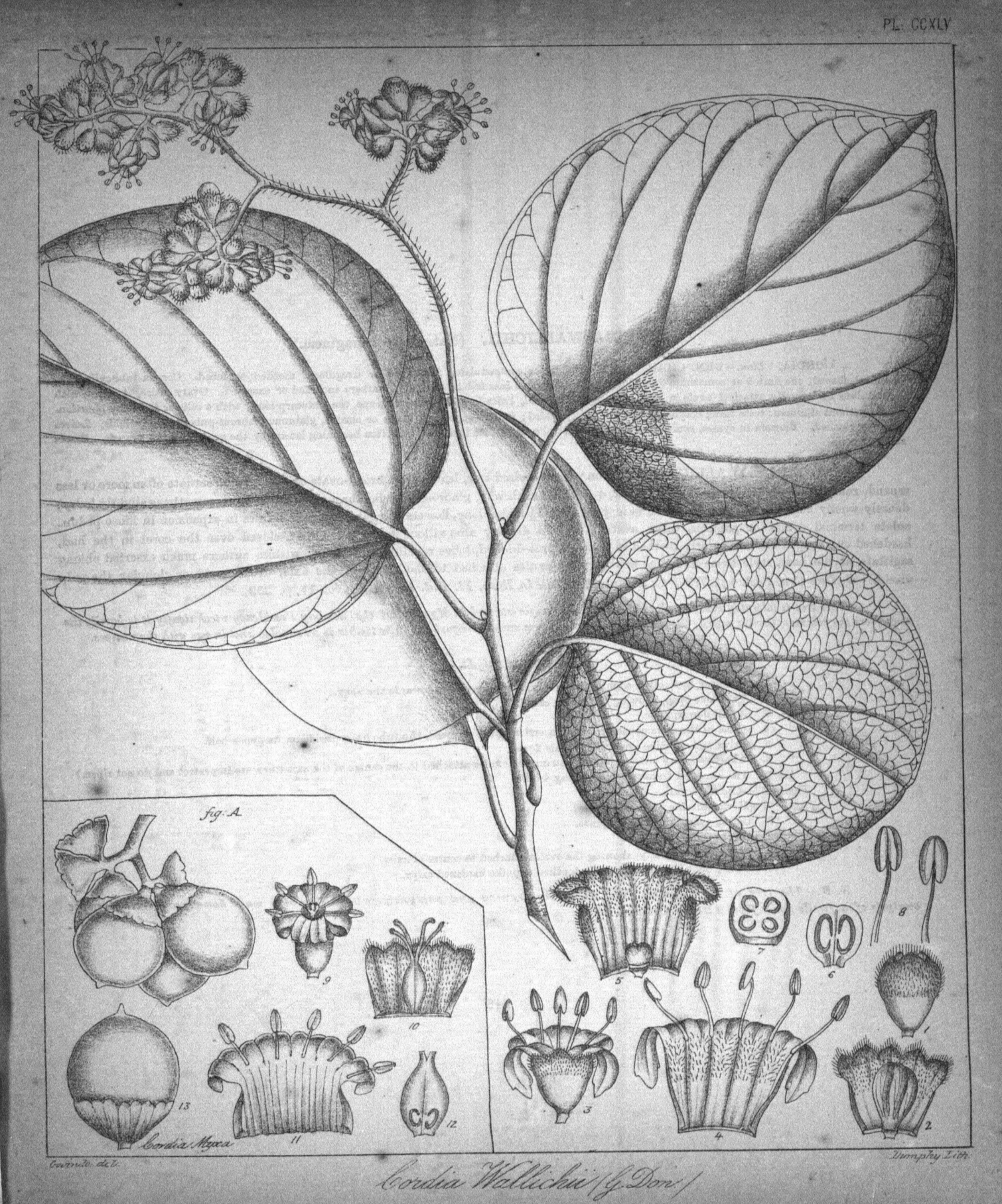
Analysis.

1. A flower bud, calyx slightly 5-lobed densely albo-villous towards the apex.
2. The same open, showing the young corolla.
3. A full flower, male.
4. Corol of the same opened to show insertion of the stamens, the tube hairy inside on its upper half.
5. Calyx and abortive ovary of the male flower.
6. Abortive ovary cut vertically, showing the ovules attached to the centre of the axis (they are imperfect and do not ripen.)
7. The same cut transversely, showing 4 cells.

Figure A.—CORDIA MYXA.

8. Hermathrodite or fertile flower.
9. Calyx, ovary, style and stigmas.
10. Corol opened.
11. Ovary cut vertically, showing the ovules attached to centre of axis.
12. Fruit, showing the irregularly toothed cup-like hardened calyx.

N. B.—The tree of C. Wallichii from which the drawing and analysis were taken, had only male flowers, so I have given the analysis of a fertile flower from a tree of C. myxa.



Cordia Wallichii (G. Don)

Curtis del. Dumpley Lith.

EHRETIA LÆVIS. (Nat. order Boragineæ.)

EHRETIA. *Linn.*—GEN. CHAR. Calyx deeply divided into 5 segments. Corolla with a short or cylindrical tube, limb of 5 spreading lobes, imbricate in the bud. Stamens inserted in the tube; anthers exserted or rarely almost included. Ovary 2-celled with 2 ovules in each cell, or 4-celled with 1 ovule in each cell, style terminal, more or less 2-lobed or forked, the lobes entire, without any prominent ring. Fruit a drupe, the endocarp forming 2 two-seeded or 4 one-seeded pyrenes. Seeds with a membranous testa and usually scanty albumen; cotyledons ovate, not folded. Trees or shrubs, often glabrous. Leaves entire or toothed. Flowers rather small, usually white, in panicles or cymes, either terminal in the upper axils or rarely all axillary. Bracts small. Fruit usually much smaller than in Cordia.

EHRETIA LÆVIS. (Roxb.) A small or middling sized tree quite glabrous, leaves ovate oval or elliptical acutely acuminate or rather obtuse quite entire rounded or tapering at the base shining above, 3-5 inches long by about 2 broad. Flowers small in axillary shortly pedunculate dichotomous cymes much shorter than the leaves. Calyx-segments narrow under one line long, corol-tube about as long as the calyx, the lobes twice as long spreading, anthers exserted, ovary 4-celled with 1 ovule in each cell, style 2-forked at the apex, drupe small containing 4 one-seeded pyrenes. *DC. Prod.* ix. 505;—*Wight Ic. tab.* 1382;—*Benth. Fl. Aust.* iv. *p.* 389.

This tree is common throughout the jungles of this Presidency and in Ceylon; its timber is strong, hard and durable, and is in use for various purposes with the natives. In the Godavery forests the tree is called Paldàtam (Teligu), and in the Circars, Peda pul-mera (Teligu.)

Analysis.

1. A flower bud, showing corol lobes imbricate.
2. A full flower.
3. Corol removed and opened to show insertion of the stamens.
4. Anther, front and back view.
5. Calyx, ovary and style.
6. Ovary cut transversely, showing its 4 cells.
7. Ovary cut vertically, showing the pendulous ovules.

Govindo del. Humphry Lith.

Ehretia laevis. (Roxb.)

SALVADORA WIGHTIANA. (Nat. order Salvadoraceæ.)

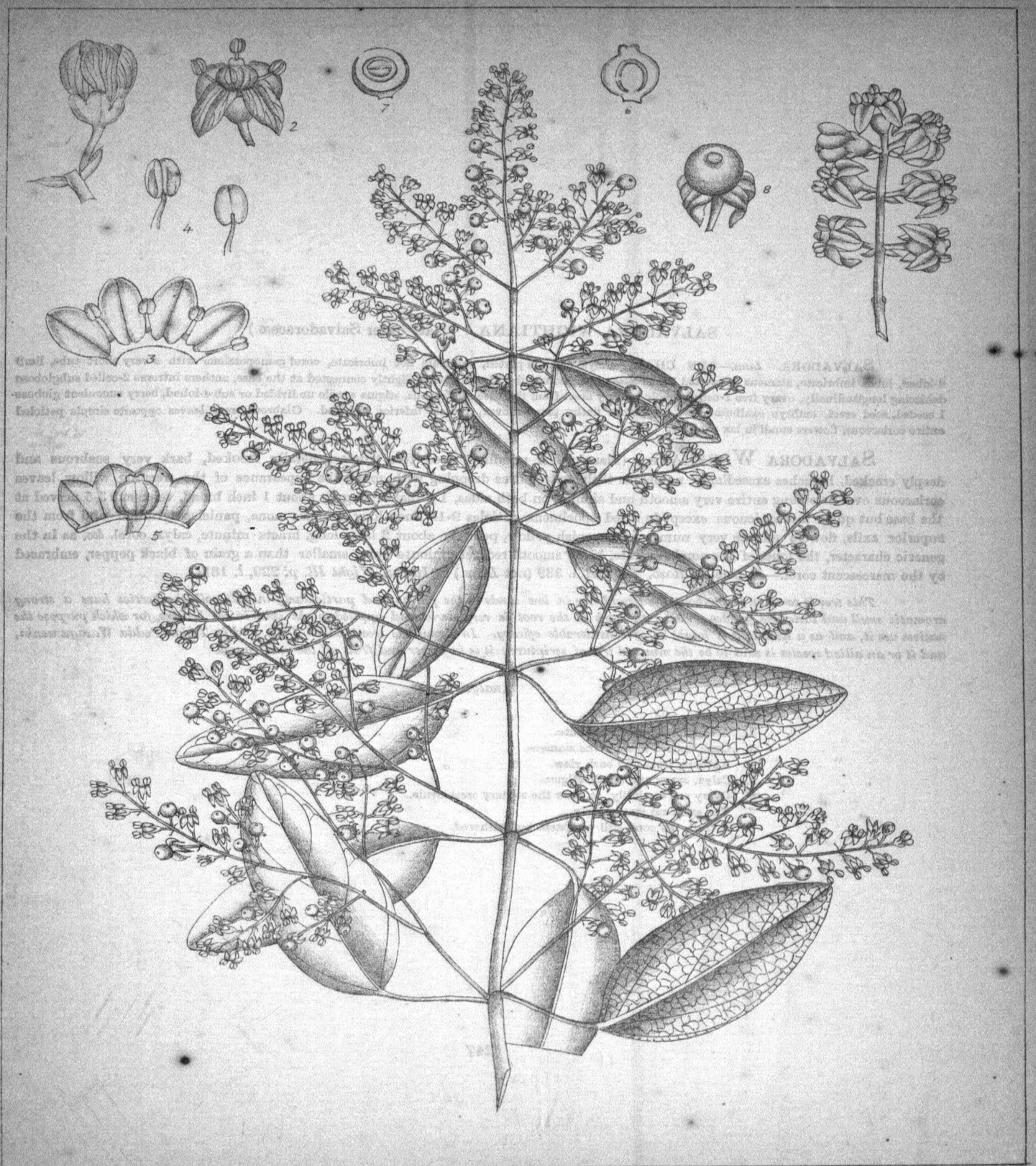
SALVADORA. *Linn.*—GEN. CHAR. Calyx small 4 parted, segments not imbricate, corol gamopetalous with a very short tube, limb 4-lobed, lobes imbricate, stamens 4 inserted at the base of the corol tube, the filaments slightly connected at the base, anthers introrse 2-celled subglobose dehiscing longitudinally, ovary free 1-celled, ovule solitary erect from the base anatropous, stigma sessile undivided or sub 4-lobed, berry succulent globose 1 seeded, seed erect, embryo exalbuminous, cotyledons fleshy plano-convex, radicle inferior included. Glabrous trees, leaves opposite simple petioled entire coriaceous, flowers small in lax panicles.

SALVADORA WIGHTIANA. (Planch.) A middling sized tree, trunk generally crooked, bark very scabrous and deeply cracked, branches exceedingly numerous their extremities drooping with much the appearance of the weeping willow, leaves coriaceous oval or oblong entire very smooth and shining on both sides, 1-2 inches long by about 1 inch broad, veins sub 3-5 nerved at the base but quite inconspicuous except in dried specimens, petioles 9-10 lines long, stipules none, panicles terminal and from the superior axils, flowers minute very numerous greenish yellow, pedicels about 2 lines long, bracts minute, calyx, corol, &c, as in the generic character, the lobes of the corol revolute, berry smooth red very minute juicy smaller than a grain of black pepper, embraced by the marcescent corol.—S. persica, *Roxb. Fl. Ind.* i. 389 (not *Linn.*) S. Indica, *Wight Ill. p.* 229, *t.* 181.

This tree is common throughout the Presidency in low lands in the plains and particularly in salt soil, the berries have a strong aromatic smell and taste like garden cresses; the bark of the root is very acrid and applied to the skin raises blisters, for which purpose the natives use it, and as a stimulant it might be of considerable efficacy. In Tamil the tree is called Opa, and in Teligu Pedda Waragu wenki, and it or an allied species is said to be the mustard tree of scripture; it is in flower and fruit all the year round.

Analysis.

1. A flower bud.
2. A full flower, petals revolute
3. Corol opened to show the stamens.
4. Anthers, front and back view.
5. Calyx, ovary and sessile stigma.
6. Ovary cut vertically, to show the solitary erect ovule.
7. The same cut transversely.
8. A fruit, the corol still persistent but withered.



Gurnae del. Dumphy lith.

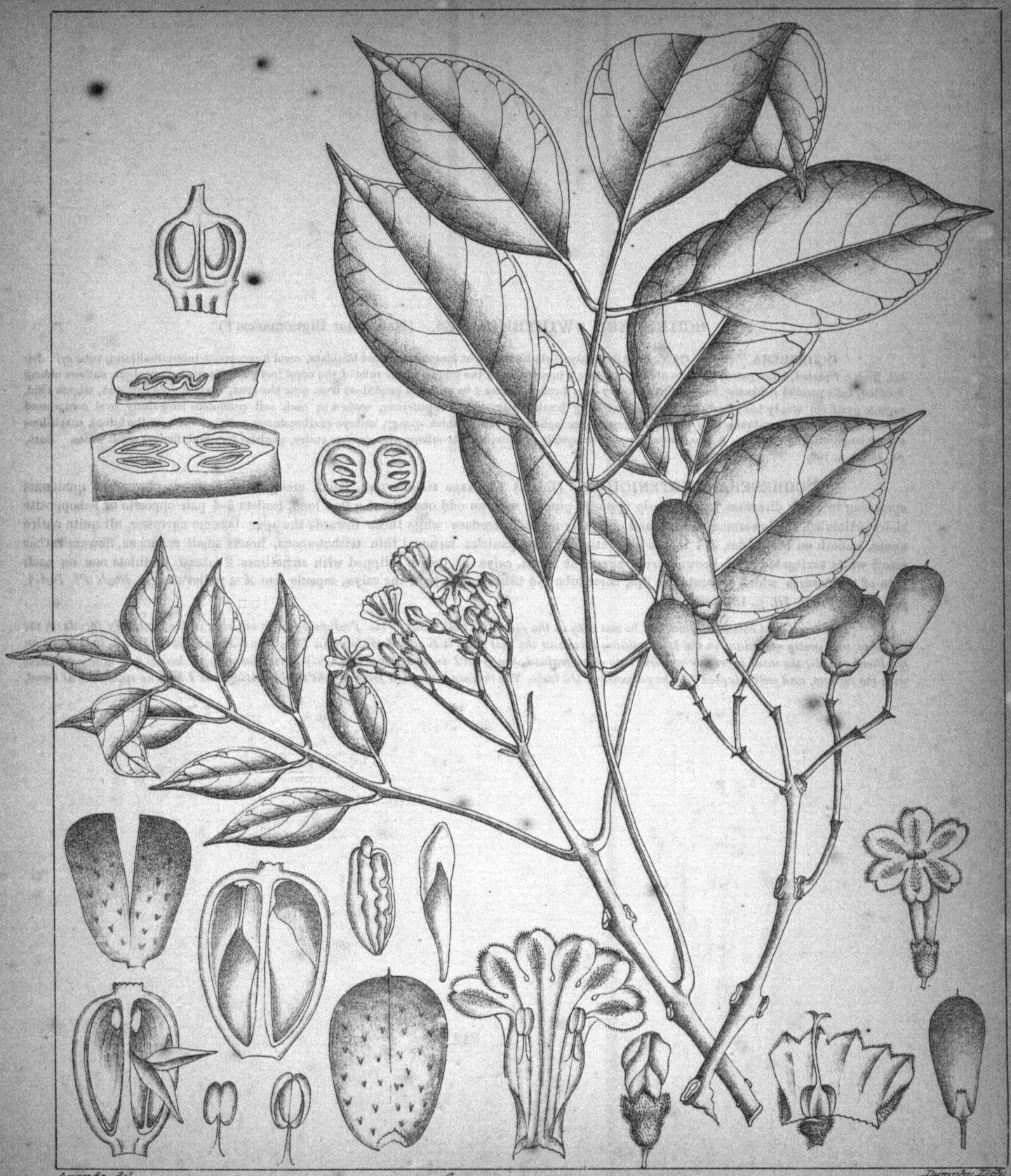
Salvadora Wightiana (Planch.)

SCHREBERA SWIETENIOIDES. (Nat. order Bignoniaceæ ?)

SCHREBERA. *Roxb.*—GEN. CHAR. Calyx tubular 5-cleft at length somewhat bilabiate, corol hypogynous infundibuliform, tube cylindrical, limb 5-7 parted, lobes patent cuneate obtuse, stamens 2 inserted on to the middle of the tube of the corol included, filaments very short, anthers oblong 2-celled, cells parallel dehiscing longitudinally, ovary free 2-celled, ovules 4 in each cell pendulous from near the apex, style simple exserted, stigma bifid, capsule pyriform woody hard scabrous 2-celled dehiscing loculicidally, valves septiferous, seeds 4 in each cell pendulous irregularly oval compressed produced into a long membranaceous wing, testa smooth, endopleura somewhat thick spongy, embryo exalbuminous, radicle short next the hilum, cotyledons oblong longitudinally plaited. A tree, leaves opposite unequally pinnate, leaflets subopposite cordate entire, panicles terminal, flowers small white. *Roxb. Fl. Ind.* i. *p.* 109.

SCHREBERA SWIETENIOIDES. (Roxb.) A large timber tree, trunk erect, bark scabrous, branches numerous spreading in every direction, leaves nearly opposite pinnate with an odd one about a foot long, leaflets 3-4 pair opposite or subopposite short petioluled, the lowermost largest and obliquely ovate or cordate while those towards the apex become narrower, all quite entire acute, smooth on both sides, 3-4 inches long, stipules none, panicles terminal thin trichotomous, bracts small caducous, flowers rather small white variegated with brown very fragrant at night, calyx at length 2-lipped with sometimes 2 lateral toothlets one on each side of the fissures which separate the lips, corol-tube 3-4 times longer than the calyx, capsule size of a pullet's egg. *Roxb. Fl. Ind.* i. *p.* 108 ;—*Wight. Ill. p.* 185 *tab.* 162.

This tree is not common, though to be met with in the forests on both sides of the Presidency, it is not rare in the Godavery forests on the east side, and pretty abundant in the Mudumullay forests on the west side; it is called Makkam in Teligu and Mogalinga in Tamil, and Moka on the Bombay side; the wood is grey or whitish, very close grained, heavy and durable, does not warp, used for making looms and many purposes with the natives, and well adapted for the purposes of the lathe. The drawing is copied from Wight's Illustrations, as I have no specimens at hand.



Govindo. del. Dumphy lith.

Schrebera swietenioides, Roxb.

MILLINGTONIA HORTENSIS. (Nat. order Bignoniaceæ.)

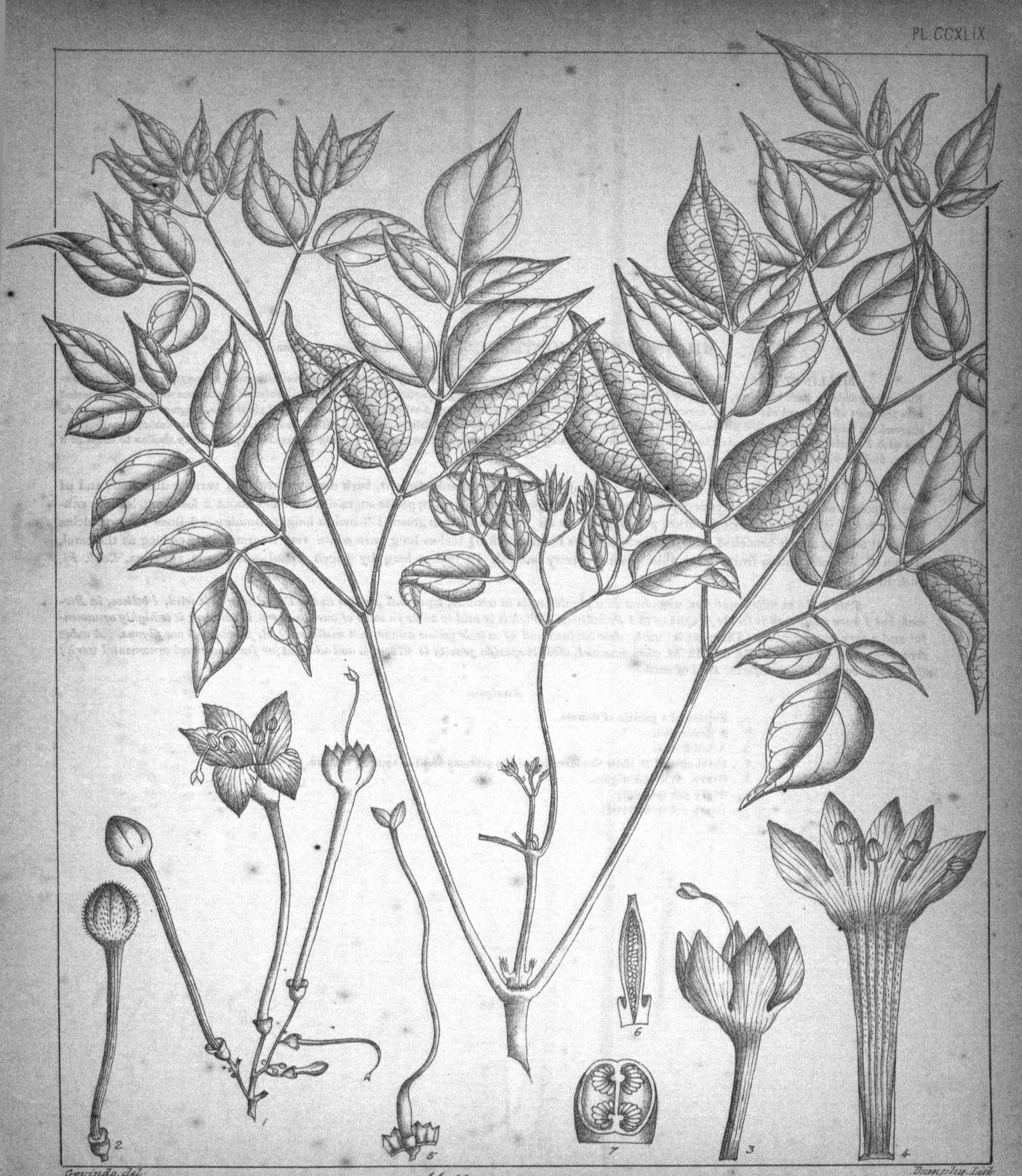
MILLINGTONIA. *Linn. fil.*—GEN. CHAR. Calyx short campanulate equally 5-toothed, teeth revolute, corol hypogynous, tube infundibuliform long slender, limb bilabiate, the upper lip erect semi-bifid, the lower spreading 3 parted, divisions equal all imbricate, stamens didynamous inserted into the jaws of the corol exserted, anthers calcarate 2-celled, cells parallel equal, ovary 2-celled, ovules numerous, style simple, stigma bilabiate, capsule siliquæform long slender 2-celled 2-valved, partition parallel, seeds numerous round very thin surrounded with a fine transparent wing, embryo exalbuminous with 2 reniform emarginate cotyledons, and the radicle pointing to the hilum. A tree, leaves opposite supra-decompound very similar to those of a Melia, flowers white showy fragrant in terminal panicles.

MILLINGTONIA HORTENSIS. (Linn.) A large tree, trunk straight, bark deeply cracked in various directions and of a soft spongy nature, young parts and young leaves slightly pubescent, leaves opposite supra-decompound about 2 feet long, leaflets subcordate entire with long tapering obtuse points, glabrous on both sides, deep green, 1-3 inches long, petiolules 2-3 lines long, panicles terminal solitary much branched, bracts minute, flowers numerous 3-3¼ inches long pure white very fragrant, style as long as the corol, stigma of 2 broad lobes, fruit linear thin pointed pretty smooth 12 inches long by ¾ inch broad.—Bignonia suberosa, *Roxb. Fl. Ind.* iii. *p.* 111.

This is the so-called cork tree, abundant in a planted state in avenues, topes and gardens in the Presidency; it is wild, I believe, in Birmah, but I have never seen it in the jungles of this Presidency, though it is said to occur in some of our Southern Provinces; it is highly ornamental and a very rapid grower. The wood is hard, close-grained and of a pale yellow colour, not easily worked, flexible but not fibrous. A cubic foot unseasoned weighs 50-52 *lbs. and* 42 *lbs. when seasoned, and its specific gravity is* ·672, *it is well adapted for furniture and ornamental work; the spongy bark yields an inferior kind of cork.*

Analysis.

1. Portion of a panicle of flowers.
2. A flower bud.
3. A full flower.
4. Corol opened to show the insertion of the stamens and the spurred anthers.
5. Ovary, style and stigma.
6. Ovary cut vertically.
7. Ovary cut transversely.



Govindo. del. Dumphy. Lith.

Millingtonia hortensis. (Linn.)

TECTONA GRANDIS. (Nat. order Verbenaceæ.)

TECTONA, *Lin. fil.*—GEN. CHAR. Calyx campanulate 5-6 cleft in fruit becoming inflated, corol infundibuliform, tube short about equalling the calyx limb 5-6 lobed, lobes subequal spreading, stamens 5-6 inserted on the tube of the corol, filaments subequal, anthers exserted cordate 2 celled, cells parallel dehiscing longitudinally; ovary free 4 celled, cells 1 ovuled, style terminal filiform, stigma small acutely bifid. Drupe dry spongy hid in the enlarged calyx containing a 4 celled hard bony nut or pyrene, embryo without albumen, radicle short inferior. A lofty tree, furnished with minute stellate pubescence, leaves simple opposite or verticelled, flowers small white in large terminal panicles.

TECTONA GRANDIS. (Roxb.) An immense tree, trunk erect up to 80-100 feet high and in girth up to 22 feet, bark ash-colored and scaly. Young shoots 4 sided, sides channelled, leaves opposite oval acuminate a little scolloped, above scabrous, below covered with whitish stellate often silvery scales, 1-2 feet long by 8-16 inches broad, petioles short thick generally 1-1½ inch long, panicles terminal very large dichotomous, hoary, furnished with lanceolate bracts at the divisions, flowers, fruit, &c. as in the generic character. *Roxb. Fl. Ind.* i. 600.

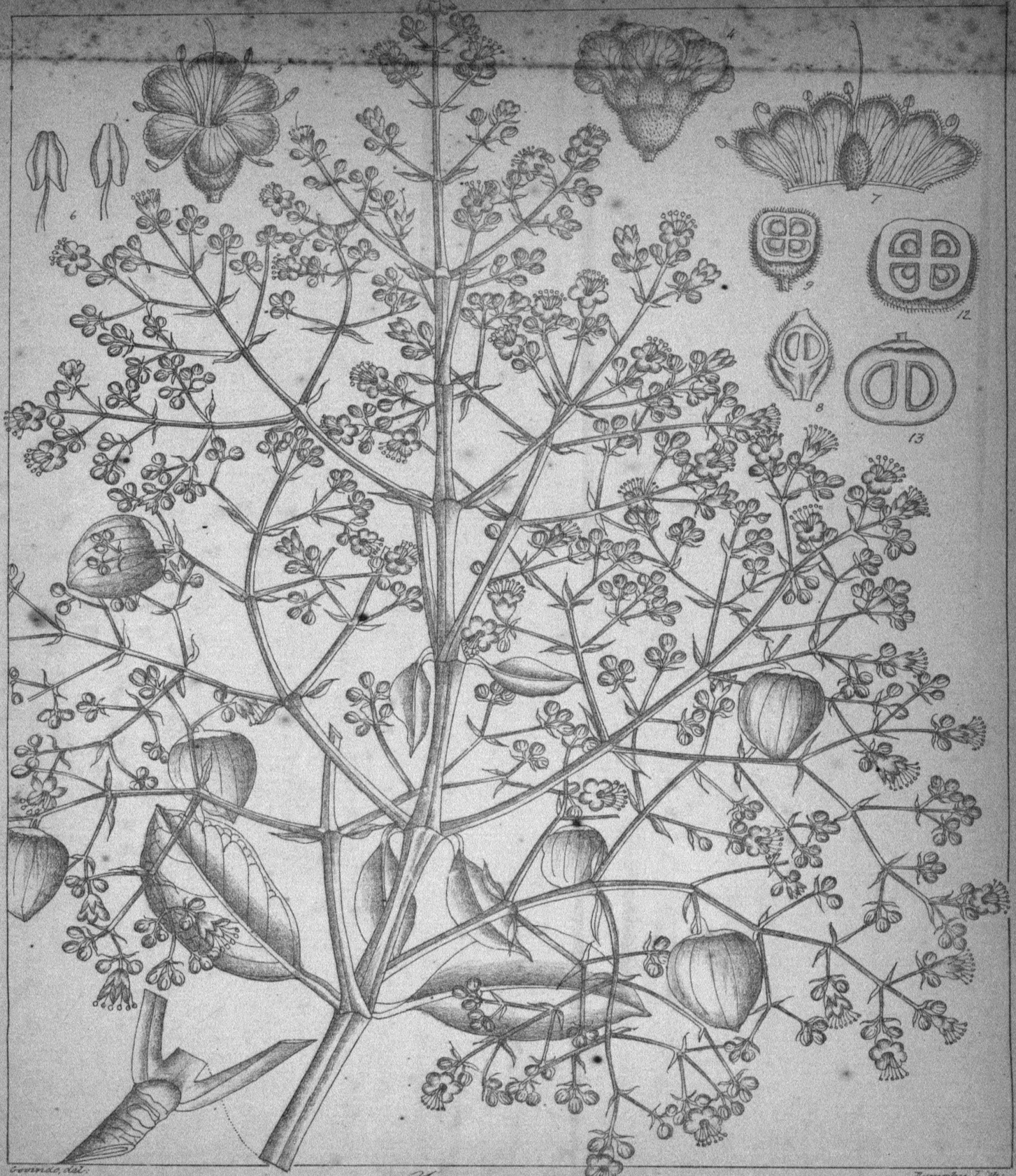
This is the well known Teak-tree which yields one of the most valuable timbers in the world, it grows to perfection on the Anamallay mountains at about 2500 feet elevation, and some of these mountain trees reach a girth of about 22 feet and a straight trunk of some 80 or 90 feet to the first bough, it is quite confined to the dry deciduous tracts of forest and is never found growing in the moist evergreen forest called sholah, though many of these tracts dovetail in and out of the Teak tracts, the tree is also found of very fine growth in a long belt of forest on the confines of Mysore and Wynad from Mudumullay in the south up to Coorg, elevation 2000 to 3000 feet, also in portions of South Canara, Malabar, Cochin and Travancore, often not much above sea level, but always in the vicinity of the range of ghats and on the western side, in all these low elevation tracts I have never met with a tree above 9 feet in girth and seldom over 6 or 7, but yet it is of fine growth and beautifully straight. Equally fine Teak is also found in certain tracts in the vicinity of the Godavery. In other parts of this presidency, such as the east side of the ghats in Tinnevelly, Salem, Cuddapah, North Arcot, &c., teak is often met with on the mountains, but it is always of very poor growth and in a measure stunted; the tree rises on the mountains to a little above 4000 feet elevation, but at any elevation much above 3000 it is of poor growth. Beyond this presidency fine teak is found in parts of the Bombay presidency (particularly North Canara), in Birmah and in Java, Sumatra, &c. The tree has been said to come to maturity in about 80 years and it probably does so in the rich alluvial soil about the base of our mountains, where its growth is rapid and its dimensions never very large; this is however certainly not the case on the mountains, for I have cut many very large trees on the Anamallays quite in their prime, which by their rings were evidently over 200 years old. The specific gravity of Malabar teak is about ·720, that of Birmah teak somewhat less. Malabar teak seasoned weighs about 45 or 46 lbs. the cubic foot, and unseasoned 55 to 60 lbs. Birmah teak is said when seasoned to weigh 37 to 43 lbs., but different conditions of growth cause great variations. The wood is very hard but easily worked and though porous very strong and durable; in color it varies from yellowish white to brown, it is very oily when fresh, takes about 2 years to season thoroughly, it is in use for a countless number of purposes, but for ship building and house building it may be said to be unsurpassed, it makes excellent furniture, but it splits and splinters too readily to be considered first class for gun carriages. The tree produces a good oil which is used with paint as a substitute for linseed oil, and which makes a good varnish. The tree is universally known throughout this presidency by its native name Tek, and in Hindoostanee it is called Sàgwàn. It is very easily raised from seed and there are large plantations of it in this presidency; in a moist climate its growth is very rapid, particularly at first, and the seedlings grow up beautifully straight. Even in climates like Madras and Cuddapah the seedlings if well watered show a very straight vigorous and rapid growth for the first 2 or 3 years, but the trees afterwards do not succeed in any of these dry districts, and its cultivation would probably never repay the labor.

Analysis.

1. The young seedling thrusting its way out of the fruit.
2. A young seedling more advanced.
3. A seedling in a still more advanced state.
4. A flower, showing the corol-lobes slightly hairy on the outside.
5. The same fully expanded, showing 6 petals (sometimes 5 only are present.)
6. Anthers.
7. Corol opened to show insertion of the 6 stamens (sometimes 5 only are present), the ovary, style and stigma, corol glabrous on the inside sometimes ciliate round the margin.
8. Ovary cut vertically.
9. The same cut transversely, showing the 4 cells.
10. Fruit enclosed in the enlarged inflated calyx.
11. Another view of the fruit, the enlarged calyx opened.
12. Fruit cut transversely.
13. The same cut vertically.

Covindo del.

Tectona grandis. (Roxb.)



Gewinde del. Humphrey Lith.

Tecoma grandis. (Roxb.)

PREMNA TOMENTOSA. (Nat. order Verbenaceæ.)

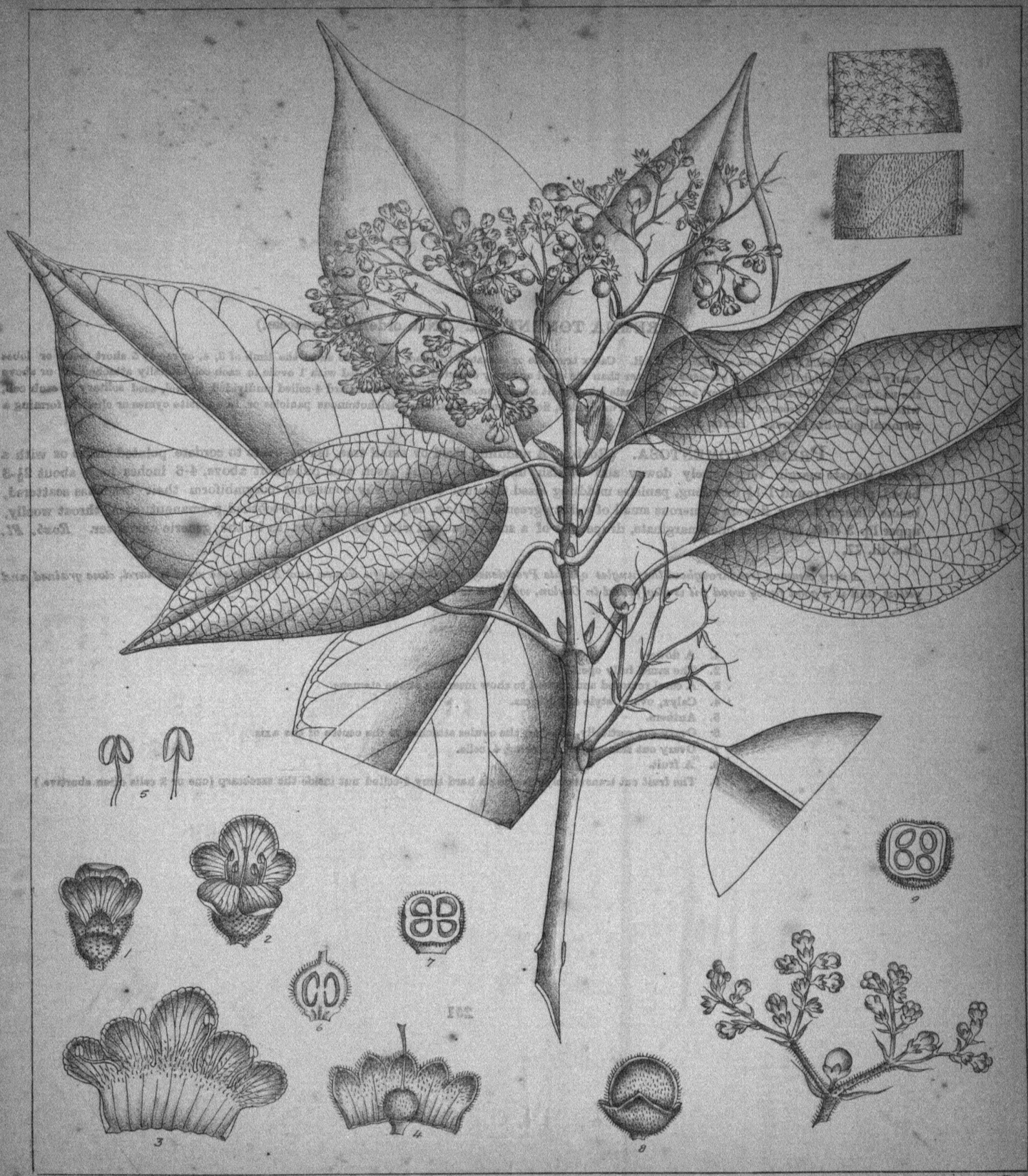
PREMNA. *Linn.*—GEN. CHAR. Calyx truncate or sinuately toothed, corol-tube short the limb of 3, 4, or rarely 5 short teeth or lobes nearly equal or slightly 2-lipped, stamens 4 shorter than the corol or rarely exserted, ovary 4-celled with 1 ovule in each cell laterally attached at or above the middle, style filiform with 2 short acute stigmatic lobes, fruit a small succulent drupe with a hard 4-celled undivided kernel, seed solitary in each cell, without albumen. Trees or shrubs, leaves opposite undivided, flowers small in terminal trichotomous panicles or in opposite cymes or clusters forming a terminal spike-like thyrsus. *Benth. Fl. Aust.* v. *p.* 58.

PREMNA TOMENTOSA. (Roxb.) A middling sized or small tree, leaves ovate to cordate pointed entire or with a waved sinuate margin very densely downy and whitish underneath, light green and pubescent above, 4-6 inches long about 2½-3 broad, petioles round 1-1½ inch long, panicles middling sized terminal erect downy somewhat corymbiform their branches scattered, bracts filiform downy, flowers numerous small of a dirty greenish yellow, calyx campanulate 5-toothed permanent, corol throat woolly, upper lip 3 cleft, the under one emarginate, drupe size of a small pea and with the nut, &c. as in the generic character. *Roxb. Fl. Ind.* iii. 77.

A very common tree throughout the jungles of this Presidency, called in Teligu Naura and Nagul; the wood is hard, close grained and yellow, and is a good fancy wood; it is also found in Ceylon, where it is called Boosairu.

Analysis.

1. A flower.
2. The same, fully open.
3. A corol removed and opened to show insertion of the stamens.
4. Calyx, ovary, style and stigma.
5. Anthers.
6. Ovary cut vertically, showing the ovules attached to the centre of the axis.
7. Ovary cut transversely, showing 4 cells.
8. A fruit.
9. The fruit cut transversely, showing a hard bony 4-celled nut inside the sarcocarp (one or 2 cells often abortive.)



Garrido del. Dionysius Lith.

Premna tomentosa. (Roxb.)

VITEX ALTISSIMA. (Nat. order Vebenaceæ.)

VITEX. *Linn.*—GEN. CHAR. Calyx 5-toothed or lobed. Corolla-tube short; limb spreading, 5 lobed, the lowest lobe larger and longer than the others and sometimes notched. Stamens 4, in pairs, ascending and exserted beyond the upper corolla-lobes. Ovary 2-celled or more or less perfectly 4-celled, with 1 ovule to each half-cell or cell, laterally attached at or above the middle. Style filiform, shortly and acutely 2-lobed. Fruit a succulent drupe, the putamen separating into 4 hard one-seeded pyrenes (or fewer by abortion.) Seeds without albumen. Trees or shrubs. Leaves opposite, usually of 3 or 5 digitate leaflets, very rarely single (or of a single leaflet.) Flowers in cymes, sometimes axillary but usually in terminal panicles either simple and spike-like or branched. Bracts very small.

VITEX ALTISSIMA. (Linn.) A very large tree, trunk erect of great girth, bark smooth, branches numerous spreading, young ones tetragonal, leaves opposite trifoliate or more rarely digitately 5 foliate, leaflets sessile elliptic oblong entire acute scarcely coriaceous subglabrous or slightly pubescent above, pubescent or downy beneath, paler beneath penniveined, 3-6 inches long by 1-2 broad, common petiole 2-4 inches long very broadly winged when young (the wing generally auricled at the base), often only slightly so in age, panicles terminal bracteated at the ramifications composed of few long simple opposite pairs of subverticelled downy spikes, flowers numerous small white with a tinge of blue, bracteoles linear lanceolate concave downy, calyx downy, segments rather unequal, corol lower lip large entire, upper shorter and 4 lobed, anthers as in the generic character. Ovary ovate 4-celled, ovules attached above the middle of the axis or near its apex, style as long as corol, stigma acutely bifid, drupe round of the size of a pea smooth succulent black, the putamen separating into 4 hard 1-seeded pyrenes or fewer by abortion. *Roxb. Fl. Ind.* iii. *p.* 71; —*Wight. Ic.* 1466.

This tree is found throughout the Presidency, and is most abundant in all our western jungles, it is also found in Ceylon, parts of Bengal, Birmah, &c., it ascends the mountains to 4000 *feet elevation, one of our most valuable timber trees next to* 3 *or* 4 *of the reserved sorts, it is called Maila in Tamil, Myrole and Sampaga pala in Canarese, and Mililla in Ceylon; the wood is hard, durable and flexible, with a coarse grain, light brown in color, and does not split or warp; it is much in use for building, construction of carts, and many other purposes; it weighs* 63 *lbs. the cubic foot when seasoned and its specific gravity is* 1·008.

Analysis.

1. Portion of a digitately 5-foliate leaf.
2. Base of the petiole of a leaf, showing auricled wings.
3. A flower bud.
4. A full flower.
5. A flower open, showing the insertion of the stamens.
6. Anthers.
7. Calyx opened, showing ovary and style, and acutely bifid stigma.
8. Ovary cut vertically, showing pendulous ovules; they are sometimes attached lower down the axis, but always above the middle.
9. Fruit.
10. Transverse section of fruit.

Gerrende, del: Dempsey, Lith.

Vitex altissima? (Linn.)

BENGAL SECRETARIAT
LIBRARY.

ORDER XLVI—RUBIACEÆ.

As a revision of this Order is just about to be published in the Genera Plantarum (Benth. and Hooker), its publication in this Manual is delayed; it can eventually be bound up in the place of this leaf, forming pages cxxv to cxxxiv.

ORDER XLVII—COMPOSITÆ.

Flowers or florets collected together in a head (rarely reduced to a single floret), surrounded by an involucre of several bracts, either in one row or imbricated in several rows, the whole having the appearance of a single flower. Receptacle on which the florets are inserted either naked or bearing chaffy scales or hairs or bristles between the florets. In each floret the calyx is wanting or converted into a pappus or ring of hairs or scales on the top of the ovary. Corollas either all hermaphrodite, tubular, and 5-or rarely 4-toothed (heads discoid), or all hermaphrodite and ligulate, that is, with a slender tube and a flat strap-shaped lamina, or those of the centre or disk tubular and hermaphrodite or male, and those of the circumference either ligulate and female or neuter, forming a ray (heads radiate), or filiform and female (heads discoid but heterogamous). Stamens 5, rarely 4, inserted in the tube of the corolla, the anthers linear and united in a sheath round the style (except in Xanthium, or where more or less imperfect), 2-celled, opening inwards by longitudinal slits, the connective usually produced at the top into a small erect appendage, the anther obtuse or sagittate at the base, the basal lobes sometimes prolonged into short and acute or long very fine and hair-like points or lobes called tails. Ovary inferior, with a single erect ovule. Style filiform, usually divided at the top into two short stigmatic branches. Fruit a small dry seed-like nut or *achene*, crowned by the pappus or naked. Seed erect, without albumen. Embryo straight or rarely curved. Radicle inferior. Herbs, shrubs or very rarely trees, with alternate or opposite leaves, without stipules. Flower-heads terminal or very rarely axillary, solitary or in panicles usually corymbose, sometimes reduced to clusters or compound heads, the general inflorescence often centrifugal, the inflorescence within the head always centripetal.

This is the largest Order in the vegetable kingdom, but with three exceptions, all its representatives in Southern India are weeds, herbs or undershrubs not coming within the scope of this Flora; the Order therefore is of no importance whatever to the forester.

Tribe Vernoniaceæ.—Leaves alternate, flower-heads discoid, the florets all tubular hermathrodite and regular or nearly so, involucre imbricate, anthers usually obtuse at the base without tails. Style branches subulate and acute not swollen at the base.

Flowers heads on separate peduncles.	
Involucre with several florets	VERNONIA.
Involucre with only 1 floret	MONOSIS.

VERNONIA. SCHREB.

For Gen. Char. see letter-press to Plate CCXXV.

1. VERNONIA VOLKAMERIÆFOLIA, *DC.*—For description, &c. see Pl. CCXXV.

2. VERNONIA JAVANICA, *DC.*—A large tree 50-60 feet high, young branches fusco-tomentose, leaves elliptic acuminate rounded at the base entire glabrous above, fusco-tomentose beneath, 6 inches long by 2½-3 broad, petioles 1½ inch long. Corymbs terminal panicled divaricate, the lateral branches elongate 3 inches and more long, scales of the involucre oval-oblong obtuse imbricate villous on the back, pappus with the outer row of bristles few or scarcely any. *DC. Prod.* v. 22. Eupatorium Javanicum, *Blume Bijdr.* 903. Leucomeris Javanica, *Blume.*

Ceylon, not uncommon at the margins of moist forests up to 5000 feet elevation, very abundant in the Ambagamwa district.

MONOSIS. DC.

For Gen. Char. see letter-press to Pl. CCXXVI.

1. MONOSIS WIGHTIANA, *DC.*—For description, &c. see Pl. CCXXVI.

ORDER XLVIII—ERICACEÆ.

Calyx more or less deeply divided into 4 or 5 teeth or lobes, the tube adnate to the ovary or quite free, sometimes exceedingly short. Corolla inferior or superior, the tube ovoid globular elongated or campanulate, the lobes spreading; valvate or imbricate in the bud, or rarely the petals distinct. Stamens twice as many or rarely of the same number as the corolla-lobes, inserted within the corolla but free from it. Anthers 2-celled, opening at the top by 2 separate pores or oblong slits or rarely by 2 slits extending their whole length. Hypogynous disk very small or none. Ovary having usually as many cells as lobes of the corolla, rarely apparently twice as many or reduced to 3 or 2, with 1 or several ovules in each cell, the placentas attached to the axis. Fruit either capsular or succulent and indehiscent. Seeds very small, with a fleshy albumen, the embryo straight, often small. Shrubs, sometimes very low creeping and almost herbaceous, more frequently erect and bushy or growing up into small trees, very rarely true herbs. Leaves entire or toothed, undivided, usually alternate, penninerved or 3 nerved. Flowers either axillary and solitary, or in short clusters or heads, or forming terminal racemes, corymbs, clusters or heads.

An order of very little importance in a forest view. Rhododendron yields 1 tree on our higher mountains, Vaccinium 3 small alpine or subalpine trees, and Gualtheria a small alpine shrub.

Tribe I, Vaccineæ:—Ovary inferior, fruit succulent indehiscent	VACCINIUM.
Tribe II, Andromedeæ.—Ovary superior, fruit a capsule opening in loculicidal valves	GUALTHERIA.
Tribe III, Rhodoreæ.—Ovary superior, fruit a capsule opening in septicidal valves	RHODODENDRON.

VACCINIUM. Linn.

For Gen. Char. see letter-press to Pl. ccxxvii.

1. Vaccinium Leschenaultii, *Wight.*—For description, &c. see Plate ccxxvii.

2. Vaccinium rotundifolium, *Wight.*—A small tree, much branched, glabrous or the young branches slightly pubescent, leaves orbicular coriaceous glabrous entire or slightly crenulato-serrate, deep green above paler beneath, 1¼-1½ inches each way, racemes axillary and terminal longer than the leaves, flowers pink urceolate 5-lobed, lobes hairy, filaments filiform hairy, bristles of the anthers minute or wanting, fruit the size of a large currant purplish-red when ripe, testa of the seed reticulated. *Wight. Ill. p.* 119. *tab.* 139.

Nilgiris, in moist woods about Ootacamund.

3. Vaccinium Neilgherrense, *Wight.*—A small tree or sometimes only a shrub, glabrous except the very young parts, leaves linear lanceolate serrate acute at the base acuminate at the point, 3¼-4 inches long by 1 inch broad, petioles 1-2 lines long, racemes from shorter to a little longer than the leaves axillary usually confined to the extremities of the branches, flowers white or rose-colored, pedicels 2-4 lines long furnished with a large foliaceous deciduous bracteole, corol-tube ovate contracted at the mouth slightly pubescent, filaments hairy, anthers bristled, tubular points dilated towards the apex. *Wight Icones tab.* 1189. V. affine and V. Donnianum, *Wight*; both answer well to forms of this plant, and are probably not distinct.

Very common on the Nilgiris, Anamallays, Pulneys, Wynad, &c. 2000 to 7000 feet elevation.

GUALTHERIA. Linn.

Gen. Char. Calyx free, deeply divided into 5 segments, enlarged under or round the fruit and then often succulent. Corolla urceolate; lobes 5, short, spreading imbricate in the bud. Stamens 10, hypogynous, included in the corolla-tube; anther-cells opening in a terminal or oblique foramen, each with 2 erect awns (4 to the anther). Ovary 5 celled, with several ovules in each cell; style inserted in a central depression; stigma capitate or peltate. Fruit a globular capsule, opening loculicidally in 5 valves, more or less enclosed in the enlarged usually succulent and berry-like calyx. Seeds small; embryo cylindrical in the centre of the albumen. Erect and bushy or low and creeping shrubs, often hispid with rigid hairs. Leaves penniveined, entire or toothed. Flowers in simple terminal or axillary racemes, each one pedicellate within a bract and 2 bracteoles, or solitary in the axils of the stem-leaves.

1. Gualtheria fragrantissima, *Wall.*—A small shrub glabrous, ramuli subtrigonous, leaves oval or ovato-oblong or obovate obtuse or acute very hard and coriaceous, crenulate glabrous above, rough with scabrous glands beneath from which arise deciduous black hairs, 2-3 inches long by 1¼-1½ broad, petioles 2-3 lines long, racemes axillary solitary pubescent shorter than the leaves, bracts concave acute glabrous 1 under the pedicel and 2 near the flower, flowers small pure white, berries blue. *Wight Icones tab.* 1196. G. Leschenaultii, *l. c. tab.* 1195. Andromeda Kotagherrensis, *Hook. Ic.* 246. Leucothœ Kotagherensis, *DC. Prod.* vii. *p.* 606.

A very common shrub on the Nilgiris and Pulneys and in Ceylon; Carbolic acid has been distilled from it.

Analysis.

1. A raceme (life size).
2. A flower showing the 2 bracteoles below the calyx.
3. Corol removed and opened, the filaments of the 10 stamens adherent to the very base of the tube.
4. Calyx, ovary and style, and the 10 lobed fleshy disk surrounding the ovary, the stamens are alternate with the lobes of this disk.
5. Front, back and side views of the anthers.
6. Ovary cut vertically.
7. Ovary cut transversely.
8. Fruit.
9. Vertical section of the fruit.
10. Transverse section of the fruit. (All drawn from fresh specimens).

RHODODENDRON. Linn.

For Gen. Char. see letter-press to Pl. ccxxviii.

1. Rhododendron arboreum, *Smith.*—For description, &c. see Pl. ccxxviii.

ORDER XLIX—MYRSINEÆ.

Flowers regular. Calyx of 5 or rarely 4 divisions or teeth, free or rarely the tube adnate to the ovary. Corolla regular, more or less divided into as many lobes or teeth or rarely distinct petals as the divisions of the calyx, imbricate and often contorted in the bud. Stamens as many as divisions of the corolla and opposite to them, inserted in the tube or at the base. Ovary 1-celled, with several ovules, usually peltate, attached to or immersed in a central placenta, usually quite free, thick, and globular. Style single, with a terminal capitate or small stigma. Fruit an indehiscent berry or drupe, or very rarely splitting lengthwise on one side. Seeds albuminous (except in Ægiceras.) Trees or shrubs, the foliage and inflorescence usually marked with resinous dots. Leaves alternate, simple, entire or toothed, without stipules. Flowers small, in axillary clusters, racemes or panicles, or rarely in terminal panicles.

An order of no importance to the forester. Myrsine yields 1 alpine tree (very common on the Nilgiris); Mæsa 1 large shrub (alpine or subalpine); Embelia 1 shrub or small tree (subalpine), beside 2 or 3 scandent plants; Samara 1 scandent shrub; Ardisia 4 small trees or large shrubs; and Ægiceras one small maritime tree or large shrub.

Ovary wholly or partially inferior ... ... MÆSA.
Ovary superior.
  Petals free to the base.
    Petals and stamens usually 5, racemes slender forming a terminal panicle ... ... EMBELIA.
    Petals and stamens 4, racemes or clusters short axillary... ... ... SAMARA.
  Petals united into a short tube with a deeply lobed limb.
    Flowers in axillary clusters ... ... MYRSINE.
    Flowers in umbels.
      Ovary and fruit obtuse, anther cells not divided transversely ... ... ARDISIA.
      Ovary and fruit acuminate, anther cells transversely divided into several pits ... ... ÆGICERAS.

MÆSA. FORSK.

Gen. Char. Calyx-tube adnate to the ovary, the limb 5-lobed. Corolla 5-lobed. Stamens 5, with slender filaments and short anthers. Ovary inferior or half-inferior; style short. Berry crowned by the calyx-lobes or teeth. Trees or shrubs. Flowers small, in simple or compound racemes, either axillary or rarely terminal. Bracts at the base of the pedicels, and 2 bracteoles under the flower usually very small.

1. MÆSA INDICA, *DC.*—A large shrub 8-12 feet, leaves oblong or elliptical acuminate membranaceous coarsely dentate glabrous or pubescent, 2-6 inches long by 1¼ to nearly 2 inches broad, petioles 2-10 lines long, racemes axillary and terminal usually branched rarely simple, 1-2 inches long, bracts lanceolate acuminate shorter than the pedicel, bracteoles ovate acute, flowers white on pedicels about 1 line long, calyx-segments ovate ciliate, corol with a very short tube, the lobes spreading to 2½ lines in diameter, ovary semi-superior, stigma capitate sublobate, berry the size of a grain of pepper more or less succulent whitish, seeds numerous angular. *DC. Prod* viii. 80;—*Wight Icones tab.* 1206. Bæobotrys Indica, *Roxb. Fl. Ind.* (*ed. Wall.*) ii. 230. [M. Sinensis, *DC. l. c.* can scarcely be distinct.]

A most common shrub throughout our western forests from little or no elevation up to 6000 feet; some forms are quite glabrous, others rather densely pubescent, particularly on the under surface of the leaf and the petioles.

Analysis, Pl. XVIII, fig. 4.

1. A portion of a leaf and the axillary inflorescence in bud.
2. A bud and a flower.
3. Corolla opened out, to show the stamens.
4. Ovary and style.
5. Ovary cut vertically.
6. Placenta and ovules.
7. Ovary cut transversely.
8. Anthers, front and back view.
9. Fruit.
10. The same cut vertically.
11. Portion of a branch in young fruit. (All except No. 1 copied from Wight's figure.) No. 1 is from a variety with hairy leaves and sessile inflorescence.

EMBELIA. BURM.

Gen. Char.: Calyx free deeply 5-(rarely 4-) lobed, petals 5 rarely 4 distinct spreading, stamens as many inserted at the base of the petals not longer than them with filiform filaments and short anthers. Ovary superior. Style short. Shrubs or woody climbers, flowers small often polygamous in simple or branched slender racemes either axillary or forming a terminal panicle.

1. EMBELIA ROBUSTA, *Roxb.*—A small tree or large shrub, glabrous or the young branches fusco-pubescent, leaves oblong to oval or sometimes nearly orbicular or obcordate entire membranaceous or subcoriaceous glabrous on both sides or pubescent beneath, often with raised glandular dots particularly near the margin, 2-3 inches long, petioles 3-6 lines long glabrous or fusco-pubescent, racemes axillary and from the old axils below the leaves solitary simple much shorter than the leaves fusco-pubescent, flowers polygamous male and hermathrodite on separate plants, small greenish white fragrant, pedicels 1-1½ lines long furnished at the base with a subulate bract, calyx deeply 5 cleft pubescent, corol 5-petaled revolute 3 times as long as the calyx pubescent often gland dotted, style short, stigma rather large, fruit spherical size of a grain of pepper. *Roxb. Fl. Ind.* i. *p.* 587;—*DC. Prod.* viii. 86. E. basool, *DC. l. c. p.* 87. Embelia tsjeriamcottam, *DC. l. c. p.* 87, *and Wight Icones tab.* 1209.

Common in the Wynad about Sultan's battery, Cochin, and elsewhere on the Malabar coast, also found in Ceylon and Bengal.

Analysis, Pl. XIX, fig 2.

Male 1. A bud,
2. A full flower, petals, stamens and sterile ovary.
3. The same 4 of the petals removed.
4. A petal inside view, showing the stamen inserted on to it a little below the centre
5. Petal outside view, showing the black glands.
6. Anthers.

Hermathrodite 7 & 8. Flowers.
9. The same opened.
10. The same 4 of the petals removed.
11. Anthers, front and back view.
12. A petal showing the stamens inserted on to it near its base.
13. Vertical section of an ovary, showing the thick globular fleshy erect placenta and 2 ovules embedded in

2. EMBELIA RIBES, *Burm.* (E. glandulifera, *Wight Icones* 1207 —is a scandent shrub common on the Nilgiris, Pulneys, &c., and Ceylon, up to 5000 feet elevation.

3. EMBELIA GARDNERIANA, *Wight Icones* 1208—is a scandent plant, Nilgiris, western slopes and Anamallays; and I have a 4th species, a very large climber, with thick leathery leaves 6 inches long and very large terminal panicles, which is probably an undescribed species, I have only found it in the forests of the Bolumpatty valley (Coimbatore hills); the panicles and young leaves are quite pink and the petals and anthers gland dotted, the young branches very warty.

SAMARA. LINN.

Gen. Char.: The same as Embelia, except that the flowers are constantly tetramerous, and the stamens longer than the petals. Scandent shrubs, flowers in short axillary racemes.—Choripetalum, *DC.*

SAMARA VIRIDIFLORA, *DC.* (Choripetalum viridiflorum, *DC.* viii. 88; C. aurantiacum, *DC. l. c.*; *Wight Icones, tab.* 1210; Samara Rheedii, *Wight Icones tab.* 1591)—is a common scandent shrub in our western forests, and is also found in Ceylon and Java; it is the only plant of the genus in S. India, and scarcely comes within this Flora, being only a climber.

MYRSINE. LINN.

For Gen. Char. see letter-press to Pl. ccxxxiv.

1. MYRSINE CAPITELLATA, *Wall.*—For description, &c. see Pl. ccxxxiv.

ARDISIA. LINN.

Gen. Char. Calyx free 5-lobed, corol deeply 5-lobed, the lobes usually very spreading or reflexed and convolute in the bud, often gland dotted, stamens as many, filaments short, anthers lanceolate erect, the slits of the cells often not reaching the base, ovary superior, style subulate usually long and persistent, the stigma not enlarged, berry or drupe globular. Trees, shrubs or very small under-shrubs, flowers white or pink rather small in umbels or very short umbel-like racemes, axillary or terminal either solitary or several together in branching panicles, leaves often gland-dotted.

Not a genus of any importance to the forester.

1. ARDISIA PAUCIFLORA, *Heyne.*—An erect very small tree or large shrub, glabrous except the young parts which are more or less furnished with ferruginous scales, leaves coriaceous often gland-dotted lanceolate obtusely acuminate entire or crenate, 2-5 inches long by 1-1¾ inch broad, veins scarcely prominent joined in a waved marginal vein, petioles 2-6 inches long, peduncles axillary and terminal rather slender ½ to 1½ inches long bearing sometimes 3-4 umbels of 4-8 small white flowers, pedicels slender 2-3 lines long slightly elongated in fruit, calyx-lobes very small glabrous or puberulous gland-dotted, corol-lobes glabrous about 1 line long and very acute gland-dotted, fruit 3-4 lines in diameter. *DC. Prod.* viii. 127;—*Wight Icones, tab.* 1214.

Very common throughout our western forests, also in Ceylon, Bengal, Java, and Hong Kong. One variety from the Travancore hills (which I cannot separate) has the leaves prominently crenated, but all my other examples have them quite entire.

2. ARDISIA RHOMBOIDEA, *Wight.*—A small tree, leaves rhomboidal acuminated, attenuated at the base into the petiole, glabrous slightly crenulately undulated on the margin, 1½-3 inches long by 6-8 lines broad, petioles scarcely more than the winged base of the leaf, peduncles axillary about 6 lines long, umbellately 3-flowered at the apex, pedicels about 3 lines long, bracts lanceolate acute, calyx-segments ovate subciliate, corol-lobes ovate acute about 1½ lines long, fruit globose 2-2½ lines in diameter. *Wight Icones tab.* 1213.

Common on the Anamallays and Travancore and Tinnevelly ghats, 2-4000 feet elevation.

3. ARDISIA PANICULATA, *Roxb.*—A small tree or large shrub, leaves lanceolate to spathulate or cuneate, oblong, short petioled or nearly sessile with a dilated amplexicaul petiole obtusely pointed, entire glabrous 6-12 inches long 3-5 inches broad, panicles terminal very large, branchlets often compound glandularly puberulous, flowers numerous pretty large rose-colored, bracts oblong, calyx-segments broad ovate black dotted puberulous, corol-lobes ovate about 3 lines long often with glandular black dots, anthers sagittate very acute. *Roxb. Fl. Ind.* i, *p.* 580. A. Courtallensis, *Wight Icones tab.* 1215.

Not uncommon in our western forests from Canara down to Cape Comorin, also in Ceylon and Bengal. My South Canara specimens have the leaves almost sessile with a much dilated stem-clasping petiole.

4. ARDISIA ELLIPTICA, *Thunb.*—A small tree or large shrub, leaves rather succulent glabrous glossy oblong or cuneate-oblong, acute entire almost veinless, 4-6 inches long by 2-3 inch broad, petioles 2-5 lines long, peduncles axillary and terminal umbelliform shorter than the leaves, often drooping very rarely branched, pedicels thick, bracts concave, flowers rather large rose-colored calyx-

segments roundish, corol fleshy, tube scarcely any, lobes spreading at length often revolute, fruit 3-6 lines in diameter black when ripe. *Thunb. Nov. Gen. pars.* 8;—*DC. Prod*, viii. 138. A. solanacea, *Roxb. Fl. Ind.* i. 580. A. umbellata, *Roxb. l. c. p.* 582. A. humilis, *Wight Icones* 1212 (not *Vahl.*) A. polycephala, *Wight Ill. tab.* 145.

Very common throughout the presidency, both eastern and western side, also in Ceylon, Bengal, and the Archipelago.

5. A. DIVERGENS, *Roxb. Fl.* i. 583.
6. A. WALLICHII, *DC. Prod.* viii. 137.
7. A. HUMILIS, *Vahl. Symb.* iii. *p.* 40.
8. A. SERRATIFOLIA, *Bedd. Icones tab.* cxiii.
9. A. AMPLEXICAULIS, *Bedd. Icones tab.* clxx.

are undershrubs found in this Presidency and Ceylon.

Analysis, Pl. XVIII, fig 3.

ARDISIA AMPLEXICAULIS.

1. A flower.
2. Corolla and stamens.
3. A lobe of the corolla and the attached stamen.
4. Ovary and calyx.
5. Ovary cut vertically, showing that it is 1-celled with several ovules attached to the basal placenta.
6. A fruit.

ÆGICERAS. GÆRTN.

Gen. Char. Calyx free, 5-cleft, corolla with 5 spreading lobes. Stamens with subulate filaments; anthers lanceolate, the cells divided transversely into several pits. Ovary superior; style subulate, acute; stigma terminal, very small. Fruit cylindrical, incurved, opening as the seed grows in one or two longitudinal slits. Seed without albumen; cotyledons thick and fleshy. Maritime trees or shrubs, with the habit of Rhizophora, and, as in those trees, the seed germinates before the fruit falls off. Flowers white, in umbels or in very short umbel-like racemes, axillary or terminal.

ÆGICERAS MAJUS, *Gærtn.*—A glabrous shrub or small tree. Leaves obovate, very obtuse, 2 to 3 inch long, quite entire, narrowed into a petiole at the base, coriaceous and evergreen. Umbels axillary and terminal, nearly sessile. Pedicels stiff, 3 to 5 lines long. Calyx nearly 3 lines long, with very obtuse stiff much-imbricate segments, closely covering the tube of the corolla, which is about their length. Corolla-lobes about the same length, spreading or reflexed, stiff and very acute. Stamens shortly exserted. Ovary very acute, growing out into a curved hornlike fruit. *Wight. Illus. tab.* 146. *Æ.* fragrans, *Kœn. R. Br. Prod.* 534.

This small milky tree, with white fragrant flowers, is very common about tidal backwaters on our western coast from Bombay down to Cape Comorin, and in Ceylon, it also inhabits the Archipelago, Australia and the South Pacific Islands

Analysis.

1. A bud, showing imbricate calyx.
2. A full flower.
3. Corolla opened showing the filaments of the 5 stamens joined in a short tube which is adnate to the bottom of the tube of the corolla.
4. The imbricate calyx opened to show ovary and style.
5. A calycine segment.
6. Anthers, front and back view.
7. Ovary cut vertically, showing the globular thick fleshy erect placenta and ovules.
8. Ovary cut transversely.
9. Young fruit.

ORDER L—SAPOTACEÆ.

Flowers regular. Calyx free, of 4 to 8 imbricate segments. Corolla more or less divided into as many or rarely twice as many lobes. Perfect stamens either as many as corolla-lobes (or as the inner ones when the lobes are in several series) and opposite to them, or rarely twice as many, besides which there are frequently small scales (or staminodia?) alternating with the lobes of the corolla, or staminodia alternating with the perfect stamens. Ovary superior, 2-or more celled, with 1 ovule in each cell, erect pendulous or laterally attached. Style simple, with an entire or very slightly lobed stigma. Fruit a berry or drupe, usually indehiscent. Seeds either with a fleshy albumen and flat cotyledons or without any albumen but with thick fleshy cotyledons. Radicle short, inferior. Trees or shrubs, with the juice very frequently milky. Leaves alternate, entire, without any (or with small very deciduous?) stipules. Flowers axillary, solitary or clustered. Bracts small or none.

This is an order of considerable importance to the forester. Bassia is represented by 5 trees in this Presidency, 2 of which are also common to Ceylon, and by 11 trees peculiar to Ceylon; they are mostly valuable timbers. Mimusops gives us 3 species, all common trees and valuable timbers. Achras is represented by 2 and Chrysophyllum by 1 mountain tree, and all three yield serviceable timbers.

Calyx segments 4 6, corol-lobes 5-14, no scales or staminodia, exalbuminous	BASSIA.
Calyx segments 6-8, corol-lobes twice or thrice as many with petaloid staminodia, albuminous ...	MIMUSOPS.
Calyx segments, stamens and corol-lobes 5-6, with small scales, albuminous	ACHRAS.
Calyx segments, stamens and corol-lobes 5, no scales or staminodia, albumen none or scanty ...	CHRYSOPHYLLUM.

BASSIA. LINN.

For Gen. Char. see letter-press to Pl. xli.

SECTION BASSIA.—Calyx 4-6 parted, corol 6-12 lobed, anthers in 2-3 series, subsessile.

* *Calyx 4-lobed.*

1. BASSIA LATIFOLIA, *Linn.*—For description, &c. see Pl. xli.

2. BASSIA LONGIFOLIA, *Linn.*—For description, &c. see Pl. xlii.

3. BASSIA MALABARICA, *Bedd.*—A good sized tree, glabrous except the inflorescence, leaves very coriaceous dark green and shining, oblong to lanceolate obtuse attenuated at the base, 4-7 inches long by about 1½ in broad, petioles 4-6 lines long, peduncles crowded axillary or at the axils of fallen leaves 4-8 together, 1-1¼ inch long; calyx 4-parted in 2 series, segments obtuse the 2 inner more membranaceous and adpresso strigose, the outer ones nearly glabrous, corol 6 (rarely 7) lobed, lobes oblong rufo-strigose on the outside. Stamens 16-18 in 2 series, filaments hairy very short crowded and close to each other and hid in the dense matted hair on the corol tube, anthers with the connective produced into a long subulate entire (rarely 2-cleft) acumen, ovary 6-celled, style much longer than the corol, ovules attached to the axis above the centre.

This tree is abundant on the banks of streams in S. Canara, Malabar and the Anamallays up to 4000 feet elevation, it yields abundance of milky juice similar to Bassia elliptica.

* * *Calyx 6-lobed.*

4. BASSIA ELLIPTICA, *Dalz.*—For description, &c. see Pl. xliii.

SECTION DASYAULUS. *Thw.*—Calyx 4-parted, corol 5-8 lobed, anthers in 1-series, double as many as lobes of corol, subsessile.

5. BASSIA NERIIFOLIA, *Moon.*—A middling sized tree, leaves glabrous narrow oblong—lanceolate obtuse narrowed at the base into a short petiole, 3-8 inches long by ½ to 1 in broad, fascicles 2-6 flowered crowded towards the apices of the branches, pedicel glabrous 1½ inches long. Calyx 4 lines long 4-parted the interior segments sericeo-strigose on the back, corol 6-parted to the middle. Stamens 12 in a single series subsessile, ovary 6-celled, fruit oblong acute 1-seeded 1¼ inches long.—Dasyaulus neriifolius, *Thw. En. Pl, Zey. p.* 175.

Ceylon, common on the banks of rivers and streams in the warmer parts of the island, called Gang mee. For dissections see Pl. cclv.

6. BASSIA MICROPHYLLA, *Hook.*—A tree, leaves coriaceous obovate obtuse glabrous on both sides, in the ordinary form about 1 inch long and 8 lines broad, but sometimes much larger, peduncles axillary 1-3 together erect, ½ as long as the leaf, calyx 4 parted, lobes ovate obtuse the 2 exterior sericeous, corol deeply 6-(rarely 5-) cleft shorter than the calyx, the tube hispid on both sides, lobes obovate, stamens 10-12 in a single series subsessile, style scarcely longer than the calyx. *Hook. Ic.* 1 *t.* 74. Bassia parviflora, *DC. Prod.* viii. *p.* 198. Dasyaulus microphyllus, *Thw. En. Pl. Zey. p.* 175.

7. BASSIA MOONII, *Thw.*—A tree, young branches fulvo-tomentose, leaves glabrous oblong obtusely acuminate or retuse subacute at the base, 3-7 inches long by 1¼-3 inches broad, petiole ½-¾ inch long, peduncle in fascicles of 2-5 about as long as the petiole. Calyx 4-parted, corol 6-lobed, fruit oblong acute 1½ inch long.—Dasyaulus Moonii, *Thw. En. Pl. Zey. p.* 176.

Ceylon, Caltura, Ratnapoora.

8. BASSIA FULVA, *Thw.*—A middling sized tree, the young branches and young leaves densely clothed with fugacious fulvous tomentum, leaves obovate oblong retuse at the apex or with a very short sudden point, narrowed at the base, 4-7 inches long by 1½-3 broad, petioles ¾ inch long, peduncles 1¼-1½ inch long, 6-8 fascicled in the axils or at the axils of fallen leaves, calyx 4-parted in 2 series, segments 3-4 lines long, ovary 6-celled, style more than double as long as the calyx.—Dasyaulus fulvus, *Thw. En. Pl. Zey. p.* 176.

Ceylon, Hewesee in the Pasdoon Corle.

SECTION DICHOPSIS. *Thw.*—Calyx 6-parted, segments in 2 series, corol 6-lobed, stamens 12 in 1 series the 6 opposite the corol lobes in longer filaments (subextrorse), the others subintrorse, connective 2-parted at the apex, ovary 6-celled.

9. BASSIA PETIOLARIS, *Thw.*—A large tree, leaves glabrous ovate with rather an abrupt short acumen, acute at the base, 3-5 inches long 1½-3 inch broad, petiole 1½ inch long, fascicles 2-5 flowered axillary crowded at the apices of the branches fulvo-tomentose, the peduncles about as long as the petioles. Calyx 6-parted in 2 series, segments 4 lines long, corol 6-lobed white 7 lines long, the tube pilose within, stamens 12 on short filaments all fertile in one series, the alternate longer ones opposite the lobes of the corol (with the anthers subextrorse,) the others with scarcely any filaments (subintrose), anthers divaricately 2-horned at the apex, ovary 6-celled, fruit subspherical 1½ inches in diameter, 1 seeded.—Dichopsis petiolaris, *Thw. En. Pl. Zeyl. p.* 176. For dissections see Pl. cclv.

Ceylon, Ambagamwa district and the Hinidoon and Reigam Corles.

SECTION ISONANDRA. *Wight.*—Calyx and corol lobes equal in number, stamens twice as many in a single series on longish filaments, anthers extrorse acuminate at the apex.

* *Calyx 4-parted.*

10. Bassia Wightiana, *DC.*—A small or middling sized tree glabrous or the young parts occasionally densely fulvo-tomentose, leaves most variable in shape and size from nearly orbicular or obovate to narrow lanceolate, 1½ inch long to 14 inches in some of the lanceolate leaved varieties, acuminate or quite obtuse at the apex, glabrous on both sides or rather densely fulvo-tomentose beneath, membranaceous to coriaceous, primary veins prominent beneath and the areoles between beautifully subparallel venose, petioles 2-6 lines long, flowers very small 2-4 lines long, fascicled in the axils or at the axils of the fallen leaves 2-12 together, pedicels very short or scarcely any. Calyx and corol 4-lobed, the former more or less hairy, ovary 4-rarely 6-celled, fruit oblong about ½ inch long more or less apiculate, red when ripe, 1-2 seeded, seed brown shining.—Isonandra, *DC. Prod.* viii. 187. Isonandra Perottetiana, *Wight Icones.* 1219. I. Candolleana, *Wight Ic.* 1220. I. lanceolata, *Wight Ic.* 359. I. villosa, *Wight Ic.* 360.

This tree is most abundant throughout our western forests and in Ceylon, from somewhat below 2000 feet elevation up to 6000; it is most variable in its foliage, but with many years observation I have no hesitation, (as proposed by Dr. Thwaites,) in uniting all Dr. Wight's species; in fact they run so one into another that they cannot be classed as varieties, except perhaps the form with the leaves fulvo-tomentose beneath, which is rare (only observed by me on the Tinnevelly mountains), but this form has the leaves sometimes lanceolate.

** *Calyx 6-parted.*

11. Bassia grandis, *Thw.*—For description, &c. see Plate cclv.

12. Bassia rubiginosa, *Thw.*—A very large tree, leaves coriaceous elliptic obovate or obovate oblong, subacute or rounded at the apex, narrowed at the base, beneath densely rubiginoso-pilose, 2½-7 inch long by 1¾-3 inch broad, petiole ½-¾ inch long convex above, fascicles 6-10 flowered adpressedly rubiginoso-pilose, pedicels from as long to 2-3 times as long as the petioles, calyx 4 lines long, 6-parted, corol 6-lobed, stamens 12 in one series, ovary 6-celled, fruit ovoid.—Isonandra rubiginosa, *Thw. En. Pl. Zey.* 177.

Ceylon, Saffragram district and Hinidoon Corle, up to 4000 feet elevation.

13. Bassia canaliculata, *Thw.*—A middling sized tree, leaves glabrous oblong shortly acuminate rounded or subacute at the base, the costa channelled on the upper side, 3-11 inches long by 1¼-4½ broad, petiole channelled, 1-1¾ inch long, fascicles 4-6 flowered adpressedly fulvo-pilose, pedicels as long or ½ as long again as the petioles, calyx 6-parted 4 lines long, corol 6-parted, stamens 12 in one series. Ovary 6-celled, fruit ovoid.—Isonandra canaliculata, *Thw. En. Pl. Zey. p.* 177.

Ceylon, Caltura district.

14. Bassia pauciflora, *Thw.*—A middling size tree, leaves glabrous oblong shortly acuminate, acute at the base, the costa channelled above, 3-8 inches long by 1-3 inch broad, petiole channelled, ½-1 inch long, fascicles few at the apices of the branches 2-3 flowered, pedicels very short, calyx 6-parted 1½ lines long, corol 6-lobed, stamens 12 in a single series, ovary 3-4 celled, fruit oblong.

Ceylon, near Ratnapoora at no elevation.

15. Bassia lævifolia, *Thw.*—A middling sized tree, the branches, petioles and inflorescence adpressedly fusco-pilose, leaves glabrous smooth and shining on both sides, oblongo-lanceolate obtuse narrowed at the base into the short petiole, 2-6 inches long, by ¾-2 inch broad, petiole convex above 2-3 lines long, fascicles 4-6 flowered, axillary solitary or twin at the apex of the branches, pedicels as long or a little longer than the petioles, calyx 6-parted, 1½ line long, corol 6-parted, anthers 12 pilose at the apex, ovary 6-celled, fruit oblong acute.—Isonandra lævifolia, *Thw. En. Pl. Zey. p.* 177.

Ceylon, Saffragram district and Reigam Corle at no great elevation.

16. Bassia lanceolata, *Thw.*—A middling sized tree, young parts and inflorescence adpressedly ferrugineo-pilose, otherwise glabrous, leaves lanceolate or oblongo-lanceolate obtusely acuminate, subcoriaceous, acute at the base, inconspicuously venose beneath, 3-5 inches long 7-14 lines broad, petiole 1 inch long, fascicles 3-6 flowered, pedicels about as long or shorter than the petiole, calyx 4 lines long.—Isonandra lanceolata, *Thw. En. Pl. Zey. p.* 442.

Ceylon, near Caltura.

MIMUSOPS. Linn.

For Gen. Char. see letter-press to Plate xl.

1. Mimusops elengi, *Willd.*—For description, &c. see Plate xl.

2. Mimusops hexandra, *Roxb.*—A good sized tree, branches glabrous, leaves hard and very coriaceous obcordate oval or orbicular very obtuse emarginate glabrous deep green and shining 1½-5 inches long by 1½-2 broad, petioles round ½-1½ inches long, fascicles 2-8 flowered axillary, pedicels glabrous reflexed shorter than the petioles, lobes of the calyx reflexed, 3 exterior ones coriaceous ovate acute glabrous on both sides, subvelutinous on the margin, 3 interior ones narrower ovate whitish on the back, corol about the length of calyx, exterior lobes reflexed, interior erect, petal-like staminodia glabrous deeply bifid, stamens 6-8, fruit oval size on an olive. *Roxb. Fl. Ind.* ii. 238.—M. Indica, *DC. Prod.* viii. 205, and *Wight's Icones tab.* 1587.

A most valuable timber tree, abundant in the Cuddapah, North Arcot, and Kurnool forests, and on the Eastern ghats, Godavery forests, &c., also found but less common in our western forests and Ceylon; it is called Khirni in Hindostanee, and Pàlà in both Tamil and Telugu (a name also given to Alstonia scholaris, Wrightea tinctoria, and other trees); it flowers in April and May. The wood is very heavy, weighing 84 to 92 lbs. per cubic foot when unseasoned, and 70 lbs. when seasoned, and its specific gravity is 1·120, it is close and even-grained, hard, compact and durable, of a purplish color when fresh, turning to reddish-brown and susceptible of a very high polish. It is used by natives for oil presses, building, and a variety of other purposes; it is excellent for rulers, handles of instruments, and all articles of turnery, and for cabinet purposes.

3. Mimusops Roxburghiana, *Wight.*—A good sized tree, leaves oval oblong or obovate obtuse at both ends or sometimes slightly cordate or unequal sided at the base, glabrous 2½-3¼ inches long by 1½-2 broad, petioles 6-8 lines long, fascicles 2-3 flowered axillary, pedicels filiform about 3 times as long as the petioles, calyx 6-8 lobed, lobes ovate acute hoary about the length of the corol, lobes of the corol lanceolate acute, stamens 6-8, petal-like staminodia about as long as the filaments broad and truncate or sub 2 lobed at the apex, jagged on the margins and at the apex, ovary 6-8 celled, fruit globose depressed above 8-9 lines in diameter, about 6 seeded. *Wight Icones tab.* 1588.

This is a very common tree in the jungles about the foot of the Nilgiris and Anamallays, and elsewhere in our western forests, but I never saw it on the eastern side of the Presidency; its timber is used for house building and a variety of purposes by the natives, and for gun stocks; it weighs 48 lbs. the cubic foot when unseasoned and 60-64 lbs. when seasoned, and its specific gravity is ·768, it is rather coarse grained, but strong, fibrous and durable, works kindly with a smooth surface, is reddish-brown in color and superior to teak in strength; in S. Canara the tree is called Renga, and in Tamil (Madura district) Kanu pala.

ACHRAS. Linn.

For Gen. Char. see letter-press to Pl. ccxxxv.

1. Achras elengioides, *DC.*—For description, &c. see Pl. ccxxxv.

2. Achras tomentosa, *Roxb.*—A tree unarmed or with a few blunt thorns, young parts with rusty pubescence, leaves scarcely coriaceous, glabrous in age except the costa, oval to oblong with a blunt short point, a little waved at the margins, 4-5 inches long by 2 inches broad, petioles 4 lines long downy, flowers axillary in fascicles of about 4 together, pedicels 3-4 lines long with a narrow ovate acute bract at the base of each, calyx rusty pubescent about 3 lines long, the 3 outer segments larger than the 2 inner, corol white twice as long as the calyx, petaloid-scales (or staminodia) broad-ovate acute as long as the stamens hairy on the inside, anthers apiculate basifixed extrorse, ovary hairy 5-celled, ovules attached to the centre of the axis, style considerably longer than the corol, stigma small truncate hairy.—Sideroxylon tomentosum, *Roxb. Fl. Ind.* i. 602.

I have only lately procured flowering specimens of this tree from the forests of Western Mysore; the fruit is said to be ovate and about the size of an olive. The tree flowers in March, and is called Hoodigolla (Canarese) in the Mysore district; it is easily distinguished from A. elengioides by its much larger and broader and more prominently veined leaves, and by its blunt thorns; the flowers in both are very similar. If it is Roxburgh's species, it also occurs on our eastern mountains.

3. Achras sapota, *Linn.*, has been introduced into this Presidency from Jamaica; it yields the fruit known as the Sapota.

CHRYSOPHYLLUM. Linn.

For Gen. Char. see letter-press to Pl. ccxxxvi.

1. Chrysophyllum Roxburghii.—For description, &c. see Pl. ccxxxvi.

A foreign species of Chrysophyllum, a middling sized tree, has been introduced into Madras gardens, and one species of Sideroxylon (which is not a S. Indian genus) is also an introduced tree at Madras.

ORDER LI.—EBENACEÆ.

Flowers regular, usually diœcious, calyx free, 3 to 5-lobed or rarely with 6 or 7 lobes. Corolla-lobes as many as those of the calyx, imbricate in the bud, usually contorted. Stamens inserted at the base of the corolla or on the torus within it, indefinite, usually from 10 to 20 in the males, fewer and sterile in the females; anthers erect, linear or lanceolate, the cells opening in longitudinal slits. Ovary free, 3 or more celled, with 1 or 2 pendulous ovules in each cell. Styles as many or half as many as cells, distinct or united into a simple or 2-cleft style, with small terminal stigmas. Fruit a berry, usually indehiscent. Seeds few, albuminous; radicle superior; cotyledons foliaceous. Trees or shrubs, the juice not milky. Leaves alternate, entire, without stipules. Flowers axillary, the females often solitary, the males usually clustered or in small cymes.

This order is an important one as it yields the different species of Ebony. The genus Diospyros is a large one, and species are to be met with in almost every jungle and forest in the Presidency up-to about 4000 feet elevation; there are in all 30 species known within our limits, 20 of which are found in S. India and the other 10 are confined to Ceylon. The best ebony comes from D. ebenum and exsculpta, the former is most abundant and on both sides of this Presidency, the latter I have only observed on the eastern and central parts. The beautiful Calamander wood of commerce is the produce of D. quæsita, a species confined to Ceylon, which might however be introduced into this presidency. The genus Maba only yields one species, a small tree or shrub, and the genus Macreightea is as far as we yet know, confined to Ceylon, where it is represented by 3 trees. The genus Holochilus (probably not distinct from Macreightea) yields 1 tree, of which the female only has been found. All the 4 genera are very closely allied, and except for convenience sake might well be united.

Calyx and corol lobes 4-5 (rarely 6), ovary cells 4-8 rarely more, with 1 ovule in each cell ...	... DIOSPYROS.
Calyx and corol lobes 3 each, ovary cells 6, 1 ovule in each cell	... MACREIGHTEA.
Calyx truncate entire, ovary cells 6, 1 ovule in each cell	... HOLOCHILUS.
Calyx and corol lobes and ovary cells 3 each, with 2 ovules in each cell	... MABA.

DIOSPYROS. LINN.

For Gen. Char. see letter-press to Pl. lxv.

1. DIOSPYROS EBENUM, *Retz.*—For description, &c. see Pl. lxv.

2. DIOSPYROS EXSCULPTA, *Ham.*—For description, &c. see Pl. lxvi.

3. DIOSPYROS WIGHTIANA, *DC.*—For description, &c. see Pl. lxvii.

4. DIOSPYROS CALYCINA, *Bedd.*—For description, &c. see Pl. lxviii.

5. DIOSPYROS EMBRYOPTERIS, *Pers.*—For description, &c. see Pl. lxix.

6. DIOSPYROS SYLVATICA, *Roxb.*—A middling sized tree, glabrous except the inflorescence, which as well as the young parts is generally minutely puberulous, leaves (turning black in drying) elliptic-oblong acuminate at the apex and attenuated at the base, 4-5 inches long by 1¼-2 broad, petioles 2-3 lines long, male peduncles about as long as the petiole with a caducous bract at the base, 6-10 flowered, pedicels very short, calyx and corol 3-4 lobed, the latter 2-3 times as long as the former, anthers 13-22, filaments inserted on the globose torus single and double mixed, no rudiment of an ovary; female flowers solitary on short peduncles, much larger than the male with an ample calyx, sterile stamens 4 inserted on the corol, styles 3-4, ovary 6-8 celled, fruit spherical 8 lines in diameter, seed oblong 6 lines long 4 lines broad, albumen ruminate. *Roxb. Fl. Ind.* ii. 537;—*DC. Prod* viii. 231;—*Thw. En. Pl. Zey. p.* 178.

A common tree in our western forests up to nearly 4000 feet, found also on our Eastern ghats and in Ceylon; called Tellagoda and Nalla kaka mushti in Teligu, and in Canarese (S. Canara) Kaka suroli; it flowers in March and April; the wood is white, strong and serviceable.

7. DIOSPYROS CORDIFOLIA, *Roxb.*—A small tree (the trunk and older branches bearing prickles), the young branches and foliage pubescent. Leaves petiolate, ovate oval-oblong or ovate-lanceolate, obtuse or acuminate, cordate round or narrowed at the base, at first thin and soft, at length more coriaceous, with the veins impressed on the upper side, 1 to 2 inches long. Male flowers usually 3 together on short recurved pedicels, the females solitary. Calyx-lobes 4, ovate obtuse ciliate about 1 line long. Corolla urceolate nearly 3 lines long, glabrous; lobes 4, shorter than the tube. Stamens in the males about 16, inserted in pairs at the bottom of the corolla, the filaments very short, the outer anthers longer than the inner ones. Fruit globular, glabrous, about ½ inch diameter to rather more, resting on the calyx, which is flat, with enlarged recurved lobes. *Roxb. Pl. Cor.* i. 38. *tab.* 50;—*A. DC. Prod.* viii. 230. D. rugosula, *R. Br. Prod.* 526. D. rugulosa, *A. DC. Prod.* viii. 229. D. punctata, *Dcne. Herb. Tim.* 79;—*A. DC. Prod.* viii. 230. D. goindu, *Dalz. Bombay Flora p.* 141 ?

This small tree is common in the plains and about the foot of mountains in dry localities throughout the Presidency and in Ceylon; in our eastern forests it is called Kàká ulimera and Vackana (Teligu); the wood is dark brown, mottled, hard and close grained, small but useful for cabinet work. The tree also inhabits North Australia. D. capitellata, *Wight's Icones* 1224 and 1588, well represents the species. I consider Roxburgh's cordifolia, D. cordifolia, *Wight's Ill. tab.* 148, has the flower much too large for this plant, and is I believe the tree I consider Roxburgh's montana.

8. DIOSPYROS CHLOROXYLON, *Roxb.*—A small tree, occasionally armed, young branches tomentose, leaves oblong rounded at both ends tomentose on both sides, 2-2½ inch long by ¾-1¼ broad, petioles 3-4 lines long. *Male*, fascicles generally 3 flowered, peduncles 2-3 times as long as the petioles, flower about 4 lines long, calyx and corol 4-lobed, stamens about 16, rudiment of ovary very hairy; female flowers solitary sessile with about 8 single stamens, styles 4 bifid, ovary 8-celled. *Roxb. Fl. Ind.* ii. 538.

This small tree I have only observed on the Nullay Mullay hills (Kurnool) 1-3000 feet elevation, and in the Northern Circars; it is allied to D. cordifolia, but differs in its longer more perfectly oblong leaves, and in its male fascicles being on much longer peduncles, and with fewer flowers. I have only specimens of the male tree.

9. DIOSPYROS MONTANA, *Roxb.*—A middling sized tree, occasionally armed, bark smooth, young branches softly downy, leaves ovate to ovato-oblong acute at the apex rounded or subcordate at the base, very softly downy on both sides or in age glabrous above, membranaceous, 2-3 inches long by 1-1¼ broad, petioles 2-3 lines long; male flowers in short reflexed racemes twice as long as petiole 5-6 flowered, stamens 16 on 8 filaments; female flowers solitary, calycine lobes acute or rounded enlarging to 4-5 lines long and reflexed in fruit very softly downy, staminodia 4 or wanting, ovary 8-celled, styles 4, stigmas large verrucose, fruit globose 6-8 lines in diameter. *Roxb. Fl. Ind.* ii. 538;—*Wight Icones tab.* 1225. D. Orixensis, *Willd. in DC.* ?

A very common tree in the plains and about the foot of the mountains throughout the Presidency. Wight's Pl. 1225. exactly represents the female of what I consider Roxburgh's montana, and I believe his Pl. 148 in Illustrations to be this tree. This and the last two species have evidently been involved in much doubt, and from Roxburgh's short descriptions it is difficult to be certain of his species. This tree has the leaves very softly downy, whereas they are rather rough in both the other species, this is called Muchi tunki and Yerri goda in the Circars (Teligu). Its wood is hard and serviceable.

10. DIOSPYROS OVALIFOLIA, *Wight.*—A large tree glabrous, leaves oval to elliptic glabrous slightly coriaceous, 1½-6 inches long by 1½-2 inches broad, petiole 2-3 lines long, male flowers aggregated on short peduncles on the naked boughs, 3-8 flowered, calyx

hairy 4-5-lobed, corol twice the length of the calyx 4-5 cleft, stamens double 16-20, rudiment of ovary very small hairy, female flowers sessile or subsessile solitary or 3-6 aggregated, flowers 4-5 merous, sterile stamens entirely wanting or 1-7, ovary 4-6 celled, stigma 2-3 lobed, lobes dilated, fruit spherical glabrous glaucous 8 lines in diameter generally 1-seeded, seed subspherical, albumen not ruminate. *Wight Icones tab.* 1227.

A common tree in our western forests from 1000 to 4000 feet elevation, abundant on the Anamallays, Wynad, Coorg, &c., and I have also found it on the Nallay Mallays, Kurnool district, and it is common in Ceylon. I know nothing of its timber or uses.

11. Diospyros Candolleana, *Wight.*—A large tree glabrous, leaves elliptic oblong obtusely acuminate very coriaceous glabrous and rather shining, 4-6 inches long by 1-2 inch broad, flowers axillary aggregated sessile, calyx and corol 4 5 cleft, densely clothed with rusty pubescence. Male flowers very numerous, stamens 10 in pairs, the filaments united at the base, the anthers with a sharp short point at the apex ; female, calyx segments revolute at the margins. Staminodia 4-5 single, ovary 4-celled, style simple, stigma 2-lobed. *Wight Icones tab.* 1221-22.

This tree is not uncommon on the northern slopes of the Nilgiris and in the Wynad. I know nothing of its uses.

12. Diospyros Nilagirica, *Bedd.*—A middling sized tree, branchlets, young leaves, and inflorescence densely rufo-tomentose, leaves elliptic attenuated at both ends glabrescent and shining above, 5-6 inches long by about 2 inches broad ; male flowers, in axillary subsessile several flowered capitula bracteated, calyx 4-cleft to about the middle, corol 4-cleft with the lobes rounded, stamens 16 unequal in length in 8 pairs inserted on to the base of the tube of the corol, filaments hairy, a small hairy ovoid rudiment of an ovary ; female flowers sessile or 2 in the axils of the leaves, calyx enlarging in fruit dilated between the lobes with the margin reflexed, sterile stamens 8 alternately longer on single filaments inserted on to the base of the corol tube, styles 4 much reflexed, stigmas dilated, ovary 8-celled, fruit globose depressed size of a small greengage. *Bedd. Icones part* vii. *tab.* cxxxvi.

Sisparah ghat, Nilgiris 3000-4000 feet elevation.

13. Diospyros Thwaitesii, *Bedd.*—A middling sized tree, branchlets, young leaves and inflorescence rufo-tomentose, leaves elliptic with a long gradual acumination slightly attenuated at the base, 4-5 inches long 1-1½ broad reddish brown when dry, petioles about ½ an inch long. Male flowers 1-3 sessile in the axils, bracteated, stamens 10-12 in pairs of nearly equal length inserted on to the base of the corol tube ; female flowers as in the male, calyx enlarging in fruit, sterile stamens 5 on the corol tube, each anther tipped with 2 very long setæ, styles 3-2-cleft, ovary 4-celled, fruit subspherical, densely rufo pilose at length glabrous 7-8 lines in diameter, seed oblong black transversely striated 5 lines long 2½ lines broad, albumen ruminate.—Diospyros Candolleana, *Thw. En. Pl. Zey. p.* 181—(not *Wight*)

Ceylon, at no great elevation ; allied to, but quite distinct from D. Candolleana of Wight. *Bedd. Icones part* vii. *tab.* cxxxv.

14. Diospyros toposia, *Ham.*—A middling sized tree, glabrous, leaves coriaceous, elliptic lanceolate attenuated at both ends, 4-5 inches long by 1½-2 broad, very closely and prominently reticulated, (when dry) petioles nearly ½ an inch long, male inflorescence in 3 flowered cymes on peduncles ¾ inch long on the lower leafless portions of the branchlets or in the axils of the lower leaves, calyx rough but not hairy quite entire when young, at length spliting irregularly at the apex, lobes acute unequal, corol hairy on the outside, 4 lobed at the apex, stamens 20-30 in pairs of unequal length inserted on to the torus, female flowers solitary, stamens 12-16, stigmas 4, ovary 4-6 celled, fruit spherical size of a very large strawberry glabrous but rough.

Tinnevelly hills in damp forests 3-4000 feet (called Toveray) Ceylon, (called Kahakaala) Silhet mountains. *Bedd. Icones part* vii. *tab.* cxxii.

15. Diospyros nigricans, *Dalz.*—Arboreous, glabrous turning very black in drying, leaves membranaceous glabrous oblong with a rather sudden acumination and slightly attenuated at the base, 4-5 inches long by 1½-2 broad, petioles ¼-⅓ inch long, male flowers in small 3 flowered cymes crowded on small axillary ramuli, calyx 4-parted to the middle, lobes rounded or subacute pilose and ciliate, corol 4-cleft glabrous, lobes rounded or emarginate, stamens about 26 of unequal length, filaments all single and inserted in 2 rows on to the base of the corol round a small 10 lobed rudiment of an ovary, female flowers solitary, calyx enlarging in fruit with the lobes much reflexed, fruit glabrous globose depressed 8 celled. *Dalz. Hook. Jour. of Bot.* iv. *p.* 110.

Bombay ghats. *Bedd. Icones part* vii. *tab.* cxxiv.

16. Diospyros paniculata, *Dalz.*—A middling sized tree, branches glabrous, leaves glabrous lanceolate oblong obtusely acuminate very coriaceous, veins closely reticulated (as in Toposia) 5-9 inches long by 1⅓-2¾ broad, petioles ¼-½ inch long, male flowers in axillary several flowered velvetty cymes, about ⅓ the length of the leaves, furnished with large ovate obtuse deciduous bracts, calyx ventricose 5-parted, segments foliaceous with the margins reflexed reticulately veined, broadly oval obtuse and apiculated, corol velvetty outside, twice the length of the calyx, gibbous at the base and contracted at the mouth, the 5 segments oblong obtuse as long as the tube, stamens about 20 in pairs subequal in length inserted on the base of the tube and nearly equalling it in length ; female flowers solitary from the branches between the leaves, peduncles 2-3 times as long as the petioles furnished with 2 large ovate bracts about the middle, calyx glabrescent, as in the male but increasing with the fruit, fruit ovoid densely tomentose, 3-4 celled. *Dalz. Hook. Jour. of Botany* iv. *p.* 109 ;—*Bedd. Icones, part* vii. *tab.* cxxv.

Carcoor ghat, Wynad (2-3000 feet elevation), Anamallays, ghat up to the Nelliampaddy Coffee estates from Palghat (2000 feet), Bombay ghats.

17. Diospyros pruriens, *Dalz.*—A small or middling sized tree, young branches densely hirsute with long yellow hairs, leaves narrow-oblong with a blunt acumination more or less cordate at the base, glabrous on the upper side except the costa, very hirsute beneath, 3-5½ inches long by 1-2½ broad, petioles 1-2 lines long ; *male*, peduncles 2-3 times as long as the petioles axillary or between the axils, numerous and often congested on small young ramuli, 1-flowered or very rarely with 2 flowers, calyx 4-parted, divisions linear oblong obtuse reticulated glabrous within, very hairy on the outside, equalling the tube of the corol, corol hirsute on

the outside, limb 4 parted with the divisions as long as the tube, stamens about 14 connate at the base unequal in length and seated on the torus surrounding a very small hairy rudiment of an ovary ; female inflorescence as in the male, but corol more gibbous at the base, sterile stamens 4, very small on the corol tube, styles 2, stigmas dilated and more or less lobed, ovary very hairy 4-celled, fruit ovate conical 1½ inch long densely covered with stinging hairs. *Dalz. Hook. Jour. of Bot.* iv. *p.* 110.

Very common throughout the Wynad up to 3000 feet elevation, Anamallays, South Canara ghats and plains, Tinnevelly and Bombay ghats, also found in Ceylon. *Bedd. Icones part* vii. *tab.* cxxix.

18. Diospyros microphylla, *Bedd.*—A lofty tree, trunk very straight, young branches verticellate, hirsute with long yellowish hairs, old branches glabrous, leaves alternate, elliptic obtusely acuminated slightly attenuated at the base glabrous above sparingly hirsute with long hairs beneath when young, at length glabrous, ¾ to 1½ inches long by ⅜ to ⅝ of an inch broad, petioles 1-2 lines long ; male capitula axillary subsessile 3 flowered bracteated, flowers very small about 1 line long, calyx 4 parted to the middle, divisions ovate acute hirsute on the outside, corol 4-cleft divisions rounded apiculate, hirsute on the outside in a line down the centre, anthers sixteen in pairs 1 longer than the other inserted on to the base of the corol tube, rudiment of the ovary small hairy inconspicuously 8-lobed ; female flowers solitary in the axils, as in the male, no rudiment of stamens, ovary 4-celled, stigmas 2, fruit about as large as a pea.

Anamallays, dense forests up to 3000 feet elevation ; very common in South Canara forests of the ghats and plains (Sooleya) Wynad. *Bedd. Icones part* vii. *tab.* cxxxiii.

19. Diospyros Canarica, *Bedd.*—A good sized tree, glabrous, leaves oblong to obovato-oblong with a blunt acumination, glabrous paler beneath, 5-9 inches long by 1½ to 3 broad, petiole ½-¾ inch long, male capitula axillary many flowered sub-sessile, flowers very small, calyx 5 cleft ⅓ or ½ down, sericeous, corol about double as long as the calyx very silky on the outside, stamens 10 unequal in length in pairs inserted on to the base of the corol tube, a small ovoid hairy rudiment of an ovary ; female flowers in axillary capitula, as in the male but rather larger, calyx 5 parted to below the middle, dilated between the lobes and margins reflexed, sterile stamens 8-10 unequal in length in pairs inserted on to the base of the corol tube, ovary 4-celled, styles 2, fruit not seen.

South Canara plains near the foot of the ghats ; called Karamara, allied to D. Arnottiana, *Miq.* ;—*Bedd. Icones part* vii. *tab.* cxxxiv.

20. Diospyros insignis, *Thw.*—A very large tree, young branches slightly pilose, leaves subopposite or alternate submembranaceous glabrous oblong acuminate, attenuated or rounded at the base, 4-14 inches long by 1½ to 6 inches broad, petioles 3-5 lines long ; male capitula many flowered, flowers very small, calyx pilose 1½ lines long 4 parted to the middle, lobes acute, corol 4 lines long pilose on the outside, stamens unequal in length 14-20, single, in pairs or occasionally 3 on the same filament, partly on the base of the corol-tube and partly on the torus round a small abortive ovary ; *female*, flowers 1-3 axillary sessile, ovary 8-celled, fruit subspherical seated on the thick woody enlarged calyx which has reflexed margins. Seed 11 lines long, 6 lines broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 180.

Anamallays in dense forests 2-3000 feet elevation, Ceylon, 2000 feet. *Bedd. Icones part.* vii. *tab.* cxxx. Yields a valuable timber.

21. Diospyros crumenata, *Thw.*—A very large tree, branches glabrous, leaves glabrous oblong abruptly and obtusely acuminate rounded or slightly attenuated at the base, 2-5 inches long 1-2 broad ; petiole 3-4 lines long ; *male*, cymes pilose 2-3 lines long, 3-5 flowered bent downwards, calyx 2 lines long obscurely 4 toothed at the apex, corol hypocrateriform 5 lines long, stamens about 12-13 of equal length, anthers single seated on the torus ; *female*, flowers large solitary on short thick peduncles (2-3 lines long), calyx 4 lines long pilose on both sides 4-lobed to the middle and dilated between the lobes, lobes rounded apiculate, corol a little longer than the calyx, sterile stamens about 8 equal in length, filaments single seated on the base of the corol, ovary 8 celled, stigmas 4, fruit sub-spherical 1½-2 inches in diameter, at length glabrous 6-8 seeded, seeds black shining 1 inch long ½ inch broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 179.

Ceylon mountains, 2000-4000 feet elevation. *Bedd. Icones. part* vii. *tab.* cxxvi. A good building timber.

22. Diospyros affinis, *Thw.*—A middling sized tree, branches subglabrous, buds pilose, leaves glabrous subcoriaceous prominently reticulated, lanceolate-oblong attenuated at both ends 1¼-4½ inches long by 6-16 lines broad, turning black in drying, petiole 3-5 lines long ; *male*, cymes pilose 3-7 flowered a little longer than the petiole, calyx 1½ lines long shortly 4-toothed, corol 4 lines long hypocrateriform, stamens about 12 of equal length, filaments single seated on the torus ; *female*, flowers solitary large on short peduncles, calyx 5 lines long pilose within subglabrous on the outside, 4-cleft to the middle dilated between the lobes with long acuminations, sterile stamens 8 single of equal length seated on the base of the corol, ovary 6-celled, styles 4, fruit spherical apiculate 1 inch long at length glabrous 4-seeded, seed 6-7 lines long 4 lines broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 179, nearly allied to D. crumenata.

Ceylon mountains. *Bedd. Icones part* vii. *tab.* cxxvii. A good building timber.

23. Diospyros quæsita, *Thw.*—A large tree, branches glabrous, leaves glabrous prominently reticulated oblong abruptly acuminate attenuated at the base, 3-7 inches long by 1½-3 broad, turning blackish when dried, petioles 3-7 lines long channelled above as is the costa of the leaf ; *male*, cymes 3-7 flowered pilose about the length of the petiole, calyx shortly 5-toothed, corol hypocrateriform, stamens about 16 of equal length, filaments single seated on the torus ; *female*, flowers solitary, calyx 5-lobed to the middle dilated between the lobes, lobes acute, fruit subspherical 2-2½ inches long. *Thw. En. Pl. Zey. p* 179.

Ceylon, in the dense forests at the south of the island at no great elevation ; this is the tree which yields the valuable Calamander word of commerce. *Bedd. Icones part* vii. *tab.* cxxviii.

24. Diospyros oppositifolia, *Thw.*—A middling sized tree, leaves opposite slightly pilose when young at length quite glabrous, firm in texture ovate or elliptic abruptly shortly acuminate rounded at the base, veinlets parallel obscure, 2-6 inches long by 1½-3 broad, petioles 1-2 lines long; *male*, capitula few flowered, calyx 1 line long 4-lobed to nearly the middle, lobes acute, corol slender about 3 lines long, stamens about 8 unequal; *female*, flowers unknown. *Thw, l. c. p.* 181.

Ceylon, up to an elevation of 1000 feet, called Kalumidereya. The timber much resembles the true calamander wood. *Bedd. Icones part* vii. *tab.* cxxxi.

25. Diospyros Gardneri, *Thw.*—A middling sized tree, branches terete glabrous, buds fusco-pilose, leaves membranaceous glabrous and shining inconspicuously veined, narrow oblong acuminate, a little narrowed at the base, 3-7 inches long by 1½-2 broad, petioles 3-4 lines long. *Male*, flowers 1-4 axillary subsessile, calyx 2 lines long 4-parted to the middle, lobes triangular acute, corol 5 lines long, tube slightly inflated, stamens about 12 all more or less connate at the base, filaments pilose; *female*, flowers solitary erect, calyx 2½ lines long, lobes recurved, margins reflexed, ovary 8 celled, berry depresso-spherical apiculate (immature) 1 inch long fulvo-pilose when young, at length glabrous shining and half hid in the much enlarged calyx. *Thw. En. Pl. Zey. p.* 181.

Ceylon, up to 2000 feet elevation; called Kadoombaireya. Yields a valuable timber for building and cabinet purposes. *Bedd. Icones part* vii. *tab.* cxxxii.

26. Diospyros hirsuta, *L.*—A middling sized tree, young leaves and inflorescence-ferrugineo tomentose, leaves subcoriaceous elliptic or oblong more or less abruptly acuminate slightly narrowed at the base, at length subglabrous, 3-8 inches long 1-3 inches broad, petiole tomentose 3-4 lines long; *male*, capitula many flowered, calyx 1 line long 5-parted nearly to the middle, corol about 2 lines long, rudiment of ovary small, stamens 5 on the torus round the rudimentary ovary; *female*, flowers 1-3, calyx thick 3 lines long 5-parted to beyond the middle, lobes triangular acute margins reflexed, corol a little longer than the calyx, sterile stamens 5 on the corol tube, ovary 10-celled, fruit ovoid apiculate fulvo-tomentose 9 lines long 6-10 seeded seated on the enlarged calyx, seeds black transversely striated 7 lines long 3 lines broad, albumen ruminate. There are occasionally female flowers in the capitula on the male tree, they are small and have the ovary only 6-celled and probably abortive. *Thw. En. Pl. Zey. p.* 181;—*L. f. Supp. p.* 440;—*A. DC. vol.* viii. *p.* 223.

Ceylon, forests of the south of the island. *Bedd. Icones part* vii. *tab.* cxxxvii.

27. Diospyros Moonii, *Thw.*—A middling sized tree, branches terete slightly pilose when young but soon glabrous, leaves coriaceous oblong acuminate rounded at the base glabrous above, costa and petiole channelled, sparingly pilose beneath, 5-12 inches long 1½-4 inches broad, petiole 3 lines long, inflorescence axillary fulvo-pilose; *male*, capitula 6-10 flowered, calyx 2 lines long 5-parted nearly to the middle, corol about 4 lines long, stamens 5. *Female*, flowers 1-2, calyx thick 3 lines long margin revolute, corol about equal to the calyx in length, stigma obscurely 5-lobed, fruit 1½ inches long 6-10 seeded seated on the enlarged calyx, seed oblong compressed transversely rugose blackish, 7 lines long 4 lines broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 182.

Ceylon at no great elevation. *Bedd. Icones part* vii. *tab.* cxxxviii.

28. Diospyros attenuata, *Thw.*—A middling sized tree, leaves membranaceous glabrous or sparingly pilose oblong acuminate attenuated at the base into a short petiole, closely and minutely reticulated pale beneath, 1½-4 inches long ½-1 inch broad, petiole 1-2 lines long, inflorescence strigose with brownish yellow hairs amongst which are mixed some black hairs; *male*, capitula 3-10 flowered, calyx 1 line long 4-5 parted to below the middle, lobes lanceolate acute, corol about 2 lines long, stamens 5 on the base of the corol tube round the rudiment of an ovary; *female*, flowers solitary axillary, calyx 3-4 lines long 4-5 parted to below the middle, lobes lanceolate acute reflexed at the margin, corol a little longer than the calyx, sterile stamens 5 on the corol tube, stigmas 2 short spathuliform, ovary 4-celled, fruit oblong acuminate 1-1½ inches long 2-3 seeded, seeds chesnut shining oblong acuminate, albumen not ruminate. *Thw. En. Pl. Zey. p.* 183.

Ceylon, Pasdoon Corle, at no great elevation. *Bedd. Icones part* vii. *tab.* cxxxix.

29. Diospyros acuta, *Thw.*—A middling sized tree, young branches terete pilose but soon glabrous, leaves coriaceous glabrous or beneath sparingly pilose, oblongo-lanceolate acute rounded at the base inconspicuously venose, channelled on the costa above 5-12 inches long by 1-3 inches broad, petiole channelled ½-1 inch long, inflorescence adpressedly fulvo-pilose sometimes monœcious and then the female capitula are near the apex of the branches, and the male below, calyx 4-5 parted to below the middle, lobes lanceolate acute. *Male*, capitula many flowered, calyx 2 lines long, corol about 4 lines long, stamens as many as the lobes of the corol, rudiment of ovary very small. *Female*, capitula 1-4 flowered, calyx 4-5 lines long the segments more or less reflexed at the margins, corol about as long as the calyx, stigmas 2-3 one line long spathuliform, ovary 4-6 celled, fruit acuminated 1½ inch long seated in the slightly enlarged calyx, seed 2-3 brown shining oblong acuminate 1 inch long, albumen not ruminate. *Thw. En. Pl. Zey. p.* 182.

Ceylon Pasdoon Corle.

30. Diospyros obovata, *Wight.*—A tree glabrous except the pedicels and calyx, leaves broad obovate obtuse tapering towards the base coriaceous, 4-6 inches long by 2-3 broad, petioles 4-6 lines long, flowers axillary sessile aggregated in dense capitula, calyx deeply 4-lobed, lobes unequal imbricate interior pair glanduliferous at the apex, corol 6-lobed about the length of the calyx, lobes obtuse, stamens 18, filaments very short, anthers apiculate a large free style-like rudiment of an ovary in the centre. *Wight. Icones tab.* 1226.

I have never met with this tree, and Wight gives no special locality, though I fancy it is from our western forests; the female is unknown, it must be a very distinct species. Several other species of Diospyros inhabit our western mountains, but my specimens are too imperfect for description or determination. One fine species not described here, a very large tree (on the Anamallays and Tinnevelly ghats) with hard fruit, nearly 3 inches in diameter in fascicles of threes on the old branches, is apparently Diospyros ramiflora, *Roxb.*; the timber of many are quite unknown and attention should be given to them by all forest officers.

MACREIGHTEA. A. DC.

Gen. Char. Flowers diœcious. *Male*, calyx 3-toothed deeply cleft on one side, corol 3, rarely 4-cleft cylindrical, lobes imbricate, stamens 3-16, filaments inserted near the base of the corol very unequal in length, anthers oblong dehiscing laterally, rudiment of ovary small or nearly obsolete. *Female*, ovary 6-celled, cells 1 ovuled, ovules pendulous, style cylindrical or slightly conical, stigma small 3 parted. Trees, young parts and inflorescence pilose, leaves penniveined, flowers subsessile axillary solitary, or shortly spicate.

This is a Ceylon species with has not as yet been detected in the continent.

1. MACREIGHTEA OBLONGIFOLIA, *Thw*—A small tree, young branches pilose, leaves subcoriaceous oblong acuminate, rounded at the base, fulvo-pilose on the nerves beneath or at length glabrous, 3-7 inches long by 1-2½ inch broad, petiole hispid 1-2 lines long. *Male*, corol-tube about ½ as long again as the calyx, stamens about 12, rudiment of ovary very small pilose. *Female*, flowers shortly pedunculate, calyx hispid, lobes acute, ovary pilose, fruit subspherical fulvo-tementose 1 inch long 3-6 seeded, seed 6 lines long 4 lines broad, radicle cylindric, cotyledons oblong, albumen not ruminate. *Thw. En. Pl. Zey. p.* 183.

Ceylon, near Ratnapoora, and in the Singhe rajah and other forests between that place and Galle.

2. MACREIGHTEA OVALIFOLIA, *Thw.*—A small or middling sized tree, leaves coriaceous ovate with an obtuse acumination, rounded or slightly narrowed at the base, 2-3½ inches long by 1-1¾ inch broad, petiole 2-3 lines long. *Male*, calyx 2½ lines long equalling the tube of corol, stamens 13-16, rudiment of ovary obsolete. *Thw. En. Pl. Zey. p.* 424.

Ceylon, Hinidoon Pattoo at no great elevation.

3. MACREIGHTEA ACUMINATA, *Thw.*—A small or middling sized tree, leaves membranaceous ovate or elliptic, much acuminate, rounded at the base or a little acute, 3-5 inches long 1-1½ inch broad, petiole 1½-2 lines long *Male*, calyx 2 lines long, corol tube 4 lines long, stamens 4-5, rudiment of ovary small oblong attenuate at the apex pilose. *Female*, fruit spherical tomentose and sparingly furnished with a few long hairs 6-7 lines in diameter. *Thw. En. Pl. Zey. p.* 424.

Ceylon, Hinidoon Pattoo.

Analysis of Genera, Pl. XXI, fig. 1.

1. A flower bud (life size.)
2. The same magnified.
3. A 3-lobed corol of female flowers, no stamens.
4. A 4-lobed corol.
5. Calyx.
6. Ovary, style and 3-lobed stigma.
7. Ovary cut vertically, pendulous ovules.
8. Ovary cut transversely, 6 cells each 1-ovuled.
9. Branch in fruit.

I have no male flowers for analysis, but the corol is the same as in the female, but with 12 stamens inserted on the tube, and there is only a small rudiment of an ovary.

HOLOCHILUS. DALZ

Gen. Char. Flowers diœcious. *Female*, calyx tubular entire truncate sitting in a few imbricate scales, corol tubular 3-cleft to nearly the middle, 3 times as long as the calyx, lobes ovate obtuse spreading. Staminodia 6 inserted on the base of the corol-tube, filaments free twice as long as the anthers, ovary hemispherical glabrous 6-celled, styles 3 erect thickish, stigmas obtuse, ovules solitary in the cells pendulous. *Male*, flower unknown. A tree, leaves elliptic or oblong entire coriaceous glabrous, female flowers solitary minute white. *Dalz. in Hook. Jour. Bot.* iv. *p.* 290.

HOLOCHILUS MICRANTHUS, *Dalz.*—A middling sized tree, leaves elliptic or oblong attenuated at the base, obtusely acuminate coriaceous glabrous 4-5 inches long by 2 inches broad, petiole ½ inch long. *Female*, flowers 3 lines long axillary solitary sessile, fruit cylindric-oblong sitting in the enlarged calyx, hard dry 1 inch long *Dalz. l. c.*

The female only of this tree was discovered by Mr. Dalzell on the Bombay ghats; the male is unknown, it is probably a Macreightea; it flowers in February and March.

MABA. FORST.

Gen. Char. Flowers diœcious, calyx cup-shaped more or less 3-cleft, corol urceolate or campanulate 3-cleft, lobes convolute to the left. *Male*, stamens 3-6, sometimes 9 (the alternate ones connected at the base) or 12 connate in pairs at the base, accrete at the base with the hairy rudiment of an ovary, filaments filiform, anthers linear often apiculate dehiscing laterally; *female*, staminodia none, ovary hirsute 3-celled, cells 2-ovuled, stigma 3-parted, fruit ellipsoid or rarely globose smooth 2-3 celled, seed generally solitary in the cells (from abortion) pendent oblong transversely furrowed near the base blackish. Trees or shrubs, leaves small entire, flowers solitary or few in the axils small subsessile.

MABA BUXIFOLIA, *Roxb.*—A small tree or shrub, trunk irregular, branches numerous, young parts more or less pubescent, leaves from oval ovate obovate or orbicular to linear lanceolate from coriaceous in the smaller leaved varieties to quite membranaceous in the larger leaved forms, glabrous and shining above, glabrous or more rarely pilose beneath, from 3 lines to 5 inches in length; *male* flowers several together generally 3 in the axils of the leaves smaller than the females; *female*, flowers solitary in the axils, fruit 3-5 lines in diameter round smooth yellow when ripe. *DC. Prod.* viii. 240;—*Wight Icones* 736. Maba ebenus, *Spr. DC. l. c.* 242. M. Neilgherrensis, *Wight Icones.* 1228-29. M. angustifolia, *Mig.* M. nigrescens, *Dalz. Bomb. Flora p.* 142. Ferriola buxifolia, *Roxb. Fl. Ind.* iii. 790.

This is very common throughout the Presidency and in Ceylon, Bombay, &c, it is found from the plains up to about 6000 feet elevation, on the mountains it is a small tree but in the plains often only a shrub. It is called Alli in Teligu on the eastern side of the Presidency; and Irramballi in Tamil and Kalu-habaraleya in Ceylon; the wood is small, very hard, dark colored, heavy and durable, it is adapted for the lathe. The tree is most variable as to its leaves; the commonest variety has very small, hard, box-like leaves, but some of the mountain forms have them very much larger and quite membranaceous.

Analysis, Pl. XIX, fig. 4.

MABA BUXIFOLIA.

Male and female flowers, showing 6 stamens in the former, none in the latter, the 3 celled ovary, the cells each with 2 ovules.

Analysis of Genera, Pl. XVIII, fig. 1.

CANARIUM STRICTUM.

Fertile tree.—1. A spike of fertile flowers (life size), the flowers are never panicled as in the male.
2. A fertile flower.
3. The same calyx opened, showing 4 petals.
4. A petal.
5. A 3-merous fertile flower, calyx and petals removed, stamens 6.
6. Stamen-tube of a 4-merous flower opened out, showing 8 stamens (anthers effete ?)
7. Anthers, front and back view.
8. Ovary, style and stigma.
9. Ovary cut vertically.
10. The same cut horizontally.
11. Ripe fruit (life size).
12. The hard nut removed, showing that its apex has 3 minute points.
13. Transverse section of the nut, 3 cells (2 only perfect). All drawn from fresh specimens collected on the Anamallays.

Fig. 2. CAREYA ARBOREA.

1. A spike of flower buds, showing the bracts, and that the flowers are sessile.
2. A flower bud.
3. An advanced flower-bud cut vertically.
4. Calyx and style of a full flower, petals and stamen-tube removed.
5. A petal from a full flower.
6. Portions of the stamen-tube from a full flower, showing some of the filaments sterile.
7. Anthers, front and back view.
8. Vertical section of the ovary of a full flower.
9. Transverse section of the ovary showing that it is 1-celled with 4 large 2 lobed many ovuled parietal placentas, which do not meet in the centre except at the very base of the ovary (well described by Roxburgh under C. sphœrica, which is the same species.)
10. One of the parietal placentas.
11. Fruit (life size).
12. The same cut vertically, showing the few seeds immersed in a fibrous fetid pulp.
13. A seed.
14. The same, transverse section.
15. The same, vertical section. (All drawn from fresh specimens collected in the Anamallays.)

Pl. XXI, fig. 2.

LUMNITZERA RACEMOSA.

1, 2. Bud and flower (life size.)
3, 4. Bud and flower magnified.
5. Flower opened and ovary cut vertically, stamens 10 alternately shorter, ovules 4 pendulous in the 1-celled ovary.
6. A petal.
7. Stamens, front and back view.

I
Gualtheria fragrantissima
II
Embelia robusta
III
Aegiceras majus
IV
Maba
Eucrifolia
V
Ligustrum Perottetii
VI
Carissa carandas

GMELINA ARBOREA. (Nat. order Verbenaceæ.)

GMELINA. *Linn.*—GEN. CHAR. Calyx cup-shaped 4-5 toothed sinuate-lobed, corol-tube much dilated upwards or almost campanulate, limb oblique with 4 or 5 spreading lobes, the 2 upper ones sometimes united in an entire lip. Stamens 4 in pairs shorter than the corol, ovary 4-celled with 1 ovule in each cell pendulous from near the apex of the axis or attached at or above the middle, style filiform, stigma recurved entire or 2-4 lobed, fruit a succulent drupe the putamen hard or bony 4-celled or rarely 2-celled, seeds solitary in each cell without albumen. Trees or large shrubs, leaves opposite undivided, flowers rather large yellow in the Indian species, (or in others pink or blue) in irregular terminal panicles or simple racemes.

GMELINA ARBOREA. (Roxb.) A large tree with a light ash-colored generally smooth leprous-looking bark, trunk of considerable girth but rarely straight, leaves rhomboid ovate to cordate with a long acumination or quite rounded at the apex, entire or slightly scolloped, generally rather suddenly attenuated at the base, but sometimes deeply cordate, 3-5 nerved, furnished at the base with 2-4 prominent glands, densely downy on both sides when young with greyish mealy or golden velvetty tomentum, the upper surface often glabrous or subglabrous in age, 4-10 inches long 2-7 inches broad, petioles round downy 2-3 inches long, panicles terminal thyrsoid densely downy with greyish or golden tomentum, the bracts downy lanceolate deciduous, flowers numerous yellow tinged with brown, calyx small more or less 5-toothed hoary or densely downy, corol more or less downy, 1½ to nearly 2 inches long, the tube declinate and much dilated upwards, the limb ample sub-bilabiate, lobes 5 rounded imbricate, the 2 upper small, the 2 lateral larger, the middle lower one much the largest and generally furrowed on the inside, anthers crescent-shaped the cells diverging, the filaments glanduloso-pilose, the longer pair considerably incurved, ovary glabrous 4-celled with 1 ovule in each cell pendulous from the apex of the axis, style about as long as the stamens, stigma entire or 2, 3, 4-lobed, fruit an oval or obovoid smooth yellow drupe about as large as a damson, the putamen or nut hard 4-celled. *Roxb. Fl. Ind.* iii. *p.* 84. G. Rheedii, *Hook. Bot. Mag. t.* 4395, and *Walps Ann.* iii. 239. Cumbulu, *Rheede Mal.* i. *t.* 41 ;—*Wight Ic.* 1470.

This valuable timber tree is common in every district in the Presidency (dry forests), and is also found in Ceylon, Bengal and Birmah ; it ascends the mountains to about 5000 *feet elevation ; it has generally only a short thick trunk, but I have often met with very fine trees in the richer parts of our forests and in ravines. It is called Goomar-tek and Pedda gomru in Teligu, Gumadi in Tamil, Goombari in Goomsur, Shewan in the Bombay Presidency, and Atdemmata in Ceylon; it flowers in February and March. The wood is highly valuable, much resembling teak, as light or lighter, the color the same and the grain rather closer, never warps or shrinks, and stands the action of water as well as any wood; it appears however to be very little known or utilised in most districts in this Presidency ; the natives use it in some parts for building purposes, decking of small vessels, and carving images and other purposes ; in Bombay it is much in use for carriage panels, in the Godavery districts the yokes for bullocks are generally made of it ; it makes excellent packing cases, palanquins, &c., and takes varnish very well ; the bark and root are used medicinally.*

Analysis.

1. Base of a 5-nerved leaf, underside showing 2 large hollow glands.
2. A flower bud.
3, 4. Views of the full flower.
5. Bracts.
6. Corol opened.
7. Front, back and side views of the anthers, filament glanduloso-pilose.
8. Calyx, ovary, style and simple recurved stigma.
9. A 2-cleft stigma.
10. A 3-cleft stigma.
11. A 4-cleft stigma.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 4 cells each with 1 ovule. (All drawn from living specimens.)

Gmelina arborea (Roxb.)

BASSIA GRANDIS. (Nat. order Sapotaceæ.)

For Gen. Char. see letter-press to Pl. xli.

BASSIA GRANDIS. (Thw.) A very large tree, leaves glabrous (the young ones cano-sericeous) obovate or broadly ovate abruptly and shortly pointed or rounded at the apex, cuneate at the base, prominently venose on the underside, 2-10 inches long by 1-6 inches broad, petioles ½-1 inch long flat on the upper side, fascicles crowded at the apex of the branches adpressedly fulvo-pilose 4-6 flowered, pedicels about as long as the petioles, calyx 3-4 lines long 6-parted pilose on the outside and on the upper half of the segments inside, corol white nearly double as long as the calyx, 6 lobed, stamens 12 in a single series, anthers apiculate, filaments slender and flexuose alternately shorter, style glabrous, stigma minute, ovary hairy 6-celled, ovules attached to the centre of the axis, fruit ovoid black-purple 1½ inch long.—Isonandra grandis, *Thw. En. Pl. Zey. p.* 176.

This fine tree is found in Ceylon, Central Provinces and Saffragram district at an elevation of 3-6000 *feet, called Meeria, the seeds yield an oil similar to that of Bassia longifolia.*

Analysis.

1. A flower.
2. Calyx opened and corol removed to show ovary and style, calycine segments hairy inside on the upper half.
3. Corol opened, 12 stamens alternately shorter.
4, 5. Anthers, front and back view.
6. Ovary and style.
7. Ovary cut vertically, ovules attached to centre of axis.
8. Ovary cut transversely, 6 cells. (Drawn from dried specimens.)

Analysis.

BASSIA PETIOLARIS. (*Vide Manual*, page cxl.)

1, 2, Full flowers.
3. The calyx 6-lobed in 2 series, the inner lobes the longer.
4. Calyx opened, lobes hairy on the upper half inside.
5. Corol opened, 12 stamens in a single row slightly imbricate or sub 2 rowed, alternately shorter.
6, 7. The longer stamens, front and back view, anthers bluntly 2-lobed at the apex.
8. The shorter stamen front view, anthers sharply 2-lobed, one of the lobes long and recurved.
9. Apex of style and the hollow stigma.
10. Ovary cut vertically, ovules erect from near the base of the axis.
11. Ovary cut transversely, 6 cells.
12. Fruit. (Drawn from dried specimens.)

BASSIA NERIIFOLIA. (*Vide Manual*, page cxl.)

1. Calyx and style.
2. Corol open showing the 12 stamens in 1 row, or sub 2-rowed.
3. Anthers, front and back view.
4. Transverse section of ovary, 6 cells.
5. Fruit.
6. Seed. (Drawn from dried specimens.)

Bassia grandis. (Thw.)

HARDWICKIA PINNATA. (Nat. order Leguminosæ.)

For Gen. Char. see letter-press to Pl. xxvi.

HARDWICKIA PINNATA. (Roxb.) A very large tree, leaves pinnate 4-8 inches long, leaflets coriaceous 5-6 alternate glabrous and shining, ovate or obliquely ovate to ovato-lanceolate bluntly pointed, variable in size up to 4½ inches long by 1¾ broad, pinnately veined and the veins looped near the margin, veinlets beautifully reticulated, generally minutely dotted on the underside (under the lens), petiolules 2-3 lines long, stipules minute ovato-lanceolate early deciduous, panicles terminal slender shorter than the leaves with 3-5 racemose branches, flowers minute on pedicels about ½ a line long with a bract at the base of each, calyx closely pressed by 2 scale-like bracteoles, 5-parted, segments imbricate the three outer longer than the 2 inner all ciliate and conspicuously pellucid dotted, anthers 10 all fertile attached to the filament by the centre of the back, filaments slender nearly double as long as the calyx, hairy at the base equal or subequal in length or alternately a little shorter, ovary and style hairy the latter slightly longer than the filaments, stigma small capitate peltate, ovule solitary pendulous from near the apex of the cell, legume indehiscent obovate coriaceous or almost woody, 2-2¼ inches long by 1 inch broad, sometimes compressed at the base below the seed and wing-like and often with a small recurved mucro at the apex, seed pendulous from the apex, testa brown membranaceous, cotyledons replete with cells filled with balsam, the radicle and plumule protruding from the apex of the legume. *Roxb. Fl. Ind.* ii. 425.

This tree is very common on the S. Travancore ghats (Asamboo hills) in the dense moist forests up to 3000 feet elevation, and I have also found it on the Tinnevelly side just above Courtallum (between the 2nd and 3rd falls) and on the new Manjerabad ghat (S. Canara), about 1500 feet up from Siradi. The tree yields a dark red balsam almost exactly like the balsam of Copaiva, and with all the same properties; the tree is called in Travancore Matâyen Sampràni (which means fool's incense), and the balsam is extracted and used medicinally: to obtain it a deep notch is made into the heart of the tree, and after a time it begins to flow; the tree flowers in March and April, and the legumes ripen in July. The wood is much used by the coffee planters and others for building purposes.

The following is Mr. Broughton's report upon some of the balsam which I submitted to him for analysis.

This substance appears on examination to consist of a solution of certain chemically different resins in an essential oil, and is in fact an Oleo-resin. Like the wood oils from the different species of Dipterocarpus, it greatly resembles both in composition and properties the Copaiva balsam, though it lacks the transparency and light yellow color of the latter. It is nearly entirely soluble in Ammonia but does not produce a clear solution. The essential oil has the same composition as that from Copaiva balsam. It boils (on the Neilgherries) at a temperature of 225° C. It rotates the plane of polarization to the left, but in a different degree to that found with the oil from Copaiva. This essential oil occurs in different amounts in the balsam, and more abundantly in the fresher collected specimens, these are quite fluid, but other specimens are almost semi-solid, doubtless owing to the evaporation and oxidation of the oil. The oil is best obtained by prolonged distillation of the balsam with water. By this means I have obtained from an apparently old specimen of balsam 25 per cent of oil, and in the most recently collected specimen I have obtained over 40 per cent. I have made many attempts, but have not obtained any crystals of Copaivic acid from the balsam. The solid resins are of an acid character, but the balsam does not solidify so strongly as that of Copaiva after being heated with Magnesia. The oil can be separated from the balsam by Ader's process, but it is obtained in a very impure and colored state. There appears little doubt that this balsam could effectually substitute Copaiva balsam in medicine. But the appearance of the specimens that I have received is greatly inferior to the latter, and they could not certainly under present circumstances compete with the Brazilian balsam in the European markets. Whether the essential oil obtained from the balsam could be profitably manufactured and exported I am unable to say, as I am not acquainted with the cost of the balsam in Travancore. This balsam is well worthy of being tried in medicine, since from its composition it appears to be well suited for employment, at least in the neighbourhood of the country in which it is collected.

Analysis.

1. A flower bud showing the bract at base of pedicel and 2 scale like bracteoles at base of calyx.
2. A full flower.
3. Calyx opened.
4. Ovary and disk, showing insertion of stamens.
5. Anthers, front and back view.
6. Ovary cut vertically, 1 pendulous ovule, style and stigma.
7. Ovary cut transversely.
8. Ripe legume cut open, showing the pendulous seed nearly filling the whole cavity.
9. A legume germinating, the long radicle and plumule protruding from its apex.
10. Germinating seed removed from the same. (Drawn from specimens in spirit.)

Gr. Curtis, del.

Dampier, lith.

Hardwickia pinnata, Roxb.

SANTALUM ALBUM. (Nat. order Santalaceæ.)

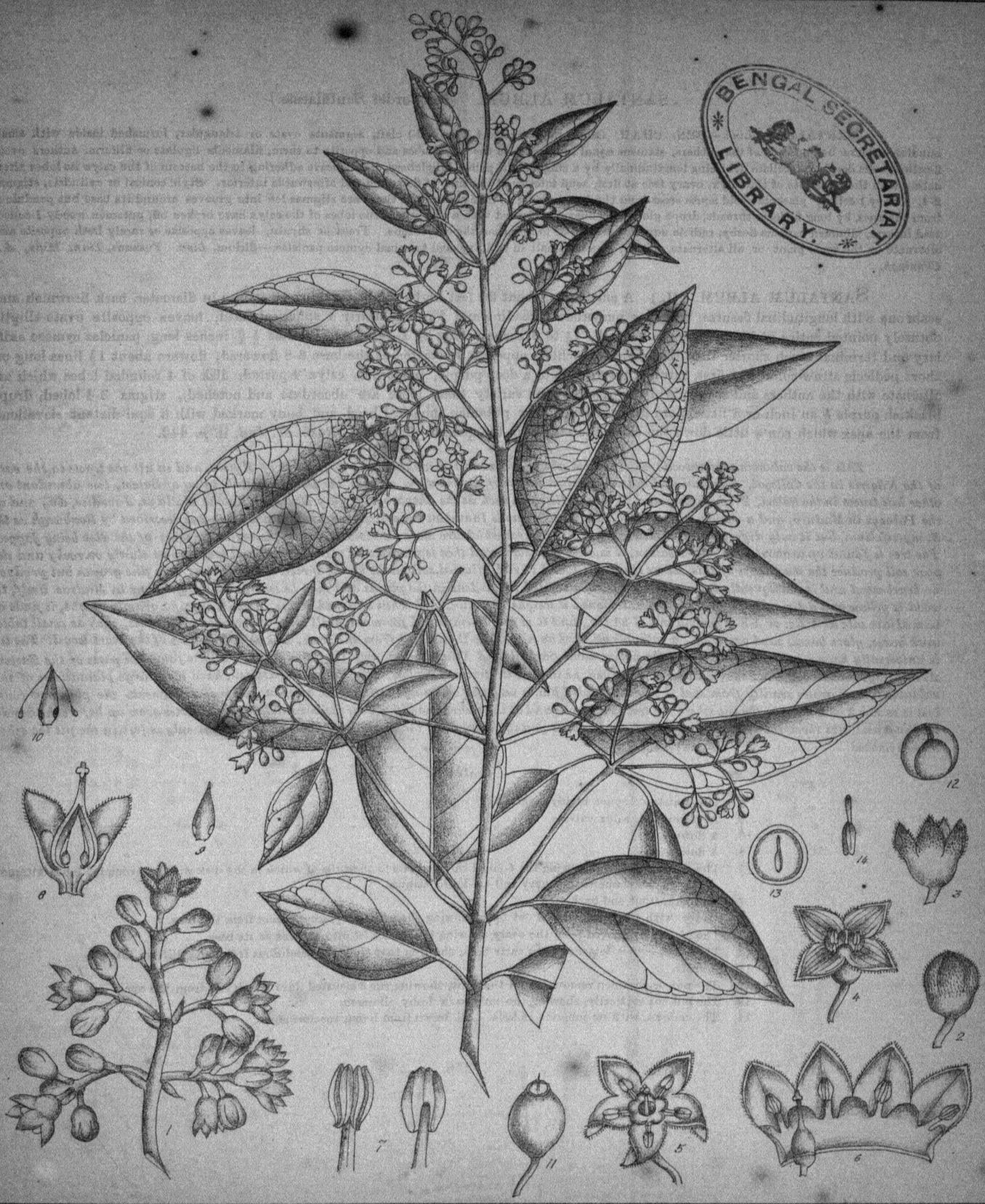
SANTALUM. *Linn.*—GEN. CHAR. Calyx campanulate 4-(rarely 5-) cleft, segments ovate or triangular, furnished inside with small bundles of hairs behind each of the anthers, stamens equal in number to the calyx lobes and opposite to them, filaments ligulate or filiform, anthers ovoid 2-celled, cells deeply bilocellate dehiscing longitudinally by a single cleft, pollen subglobose, disk concave adhering to the bottom of the calyx its lobes alternating with the segments of the calyx, ovary free at first, semi inferior at the time of flowering and afterwards inferior. Style conical or cylindric, stigmas 2-4. Ovary 1-celled, placenta ovoid acute erect from the base bearing as many ovules as there are stigmas let into grooves around its base but pendulous from the apex by long filiform threads, drupe globose or obovoid crowned with a scar where the lobes of the calyx have broken off, putamen woody 1-celled, seed inverse, albumen copious fleshy, radicle superior as long or longer than the cotyledons. Trees or shrubs, leaves opposite or rarely both opposite and alternate on the same plant or all alternate, entire; flowers small in axillary and terminal cymose panicles.—Sirium, *Linn.* Fusanus, *Linn.* Mida, *A., Cunningh.*

SANTALUM ALBUM (L.) A small tree, about 30 feet high, rarely reaching 18 inches in diameter, bark brownish and scabrous with longitudinal fissures, branches numerous spreading and forming nearly a spherical head, leaves opposite ovato-elliptic obtusely pointed entire glabrous glaucous beneath, 1½ to 3 inches long by 1-1½ broad, petioles ½-¾ inches long, panicles cymose axillary and terminal much shorter than the leaves, branchlets opposite bracteated at the base 3-8 flowered, flowers about 1½ lines long on short pedicels straw-colored at first, turning afterwards to a deep-purple, inodorous, calyx 4-parted, disk of 4 rounded lobes which are alternate with the anthers and segments of the calyx (in one variety these lobes are obcordate and notched), stigma 3-4 lobed, drupe blackish purple ½ an inch or a little more in diameter, nut or putamen spherical hard and bony marked with 3 equi-distant elevations from the apex which run a little down the sides, the rest as in the generic character. *Roxb. Fl. Ind.* ii. *p.* 442.

This is the valuable sandalwood tree, it is most abundant almost throughout the dry parts of Mysore, and in all the tracts to the east of the Nilgiris in the Collegal, Bhowani and Sattimangalum taluqs of Coimbatore, and in the Denkinacottah taluq of Salem, less abundant on other hill tracts in the Salem, Trichinopoly and N. Arcot districts, such as the Shevaroys, Kollay Mallays, Putche Mallays, Javadies, &c., and on the Palneys in Madura, and a variety with the wood almost scentless is found on our eastern coast mountains; this was described by Roxburgh as the S. myrtifolium, but it only differs slightly in the shape of the leaves which are more lanceolate, and in the scales or lobes of the disk being jagged. The tree is found up to about 4000 *feet elevation, it is only the heart wood that is scented and of any value, and trees grown slowly on rocky and dry poor soil produce the maximum of this, where the tree is found in rich alluvial soil on the banks of rivers, &c., it is of very fine growth but produces no heart wood and is consequently valueless, it is often cultivated in gardens in the plains and may be seen in many gardens in Madras itself, the wood is yellow and deliciously fragrant, when unseasoned it weighs* 72·75 *lbs. and when seasoned* 58 *lbs., and its specific gravity is* ·924, *it finds an immediate sale at* 4 *Rs. or* 4-8-0 *per maund of* 28 *lbs., and it is chiefly employed for making all sorts of ornamental articles, such as small tables, work boxes, glove boxes, card cases, &c., a valuable oil used as a perfume is distilled from the roots, and chips or pieces of the heart wood. The tree is universally known in this presidency by the native name Sandal and Chundanum and the same tree is I believe found in parts of the Eastern Archipelago; the wood and the sawdust are burned as incense in native temples. The Forest Department have now large plantations of this valuable tree, it grows readily from seed if slightly shaded but is very shy of transplanting, and after numerous experiments the plan now found best is to sow* 2 *or* 3 *seeds in the pit where the tree is to stand and at the same time a few chili seeds round them, the latter grow up before the Sandal seedlings and give them the necessary amount of shade whilst young, eventually the strongest of the* 2 *or* 3 *seedlings only is left in the pit the others being removed.*

Analysis.

1. The panicle or cyme, highly magnified.
2. A flower bud, calyx valvate
3. A flower.
4. A flower open.
5. The flower cut open, showing the 4-lobed calyx adnate to the tube of which is the disk with its 4 rounded lobes alternate with the stamens the ovary and a 3-lobed stigma.
7. Anthers, front and back view.
8. Ovary (with a 4-lobed stigma) cut open showing the fusiform placenta erect from the base.
9. The placenta removed from the ovary showing the ovules let into grooves at its base.
10. The same, ovules detached from their beds, showing that they are pendulous from long filiform threads.
11. A fruit.
12. The nut or putamen removed from the fruit, showing the 3 elevated lines which run from the apex.
13. The nut cut vertically, showing the embryo in fleshy albumen.
14. The embryo, with its superior radicle. (All drawn from living specimens.)



BENGAL SECRETARIAT LIBRARY.

Santalum album. (Linn.)

PODOCARPUS LATIFOLIA. (Nat. order Coniferæ.)

PODOCARPUS, *L'Herit.*—GEN. CHAR. Flowers diœcious or rarely monœcious. *Male*, aments axillary or terminal solitary or fascicled on a common peduncle bracteated at the base or naked, cylindric obtuse thick or slender, anther-bearing bracts numerous crowded very shortly stipitate, anthers two 1-celled, cells subglobose dehiscing extrorsely. *Female*, flowers spicate, the spike generally short rarely lax 1-2 flowered, the rachis naked or furnished with several bracts, the terminal one involucriform large subdenticulate and partially enclosing the flower or young fruit, fruit fleshy oval or globose, nut bony, embryo in the axis of farinaceous albumen. Evergreen trees or shrubs, leaves coriaceous either opposite or subopposite and then many-nerved, ovate or elliptic, or approximated or crowded 1-nerved lanceolate or linear, sometimes dimorphous.

PODOCARPUS LATIFOLIA. (Wall.) A tall erect tree 40-50 feet high with a straight trunk, up to 4-5 feet in girth, diœcious, branches horizontal spreading, young ones angled, leaves opposite or subopposite thick and very coriaceous dark shining green, many-nerved, from ovate to elliptic or narrow lanceolate acute or mucronate narrowed at the base into a short dilated flat petiole, 2½-5 inches long by ¾-1¼ broad, petiole none except the short dilated base of the leaf, male aments bracteated at the base, 4-5 lines long thick obtuse axillary solitary or 2-3 on a very short peduncle, the antheriferous bracts ovate acuminate denticulate as are the lower bracts, anthers oblong, female peduncle about 6 lines long furnished with several bracts below and one large terminal one embracing the ovary or female flower, ovary glaucous, fruit globosely oval about 1 inch long by 9-10 lines in diameter, the receptacle often becoming fleshy and much enlarged. *Wall. Pl. As. rar.* 1. *p.* 26. *tab.* 30.

This is an exceedingly interesting discovery on the South Tinnevelly mountains, being the first Conifer detected in Southern India, and the order is not represented in Ceylon. It is a very handsome tree and exceedingly ornamental when only a few feet in height, and well worth cultivating; if the species is really the latifolia of Wallich (and dried specimens were so named at Kew), the tree also inhabits the Khasya mountains in Bengal, and is found in Burmah. All the trees I examined were diœcious, and it does not quite answer to the description of latifolia (in DC. Prod.); it flowers in August and September and ripens its fruit in January and February; the tree is most abundant where I first discovered it on the hills above Calcad in the dense moist forests 3000-5000 feet elevation, where its native name is Neerambali (nerve tree). I have not myself seen it further north, but Mr. Hayne of the Forest Department informs me that he has lately detected it to the north of Courtallum. The timber appears to be very good, and a log of it was sent to England (to the reporter on Indian Indents) not long ago.

Analysis.

1. The male inflorescence (life size.)
2. The female inflorescence (life size.)
3. Male inflorescence, much magnified.
4. Female inflorescence, much magnified.
5. The anther-bearing bracts, front and back view.
6. Young fruit.
7. Ripe fruit showing the fleshy receptacle on which it is sometimes seated.
8. Fruit cut transversely.
9. Seed cut vertically showing the embryo in the axis of fleshy albumen.
10. Embryo removed, 2 cotyledons and a long inferior radicle. (Drawn from living specimens.)

Covino. del. Dunphy. Lith.

Podocarpus latifolia (Wall.)

PHYLLANTHUS EMBLICA. (Nat. order Euphorbiaceæ.)

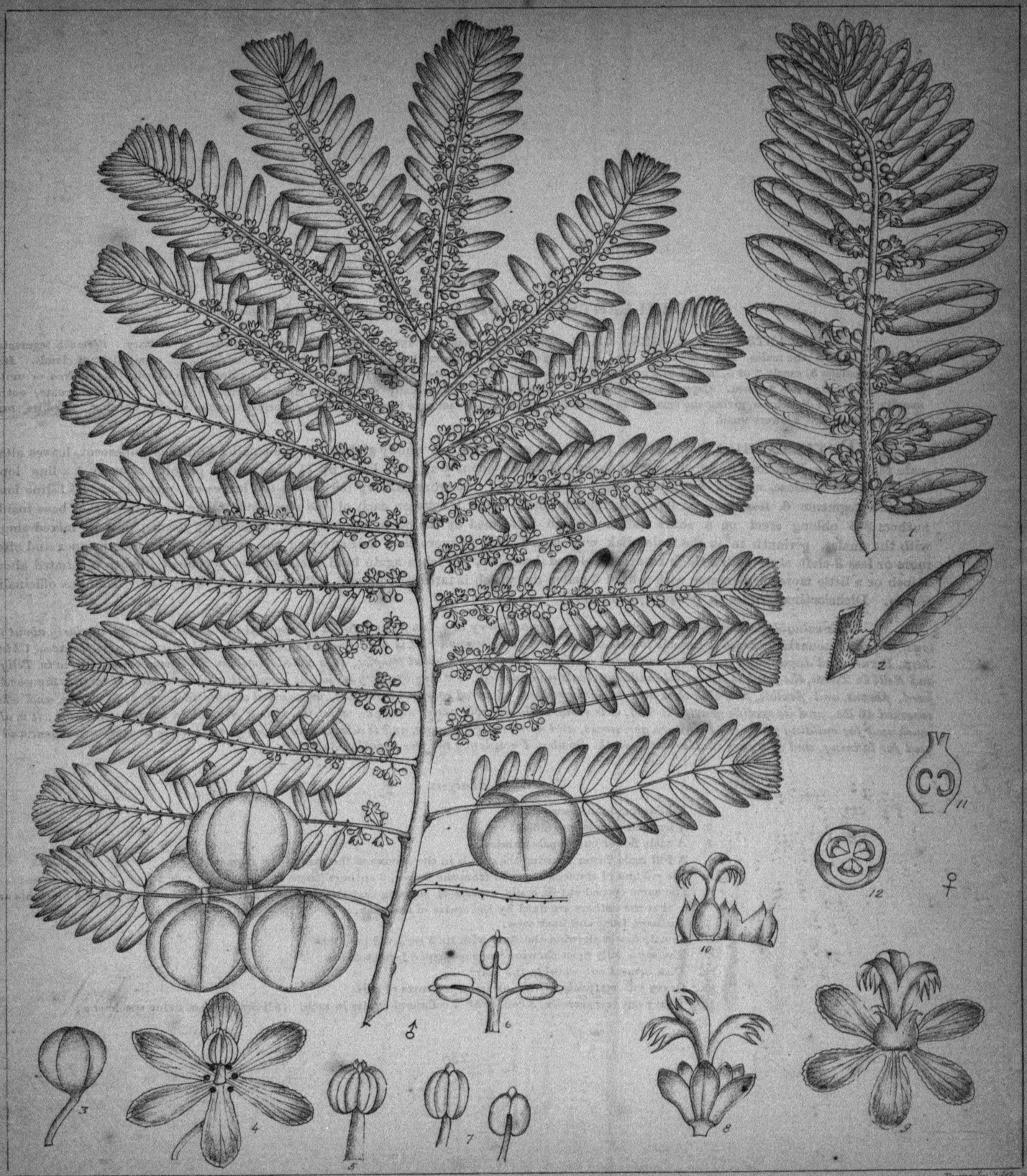
PHYLLANTHUS. *Linn.*—GEN. CHAR. Flowers monœcious or rarely diœcious, in axillary clusters or solitary. Perianth segments 6 or rarely 5 or 4 in the males, imbricate in the bud, in 1 or 2 rows. Disk prominent and entire or lobed, or consisting of small distinct glands. *Male flowers*: stamens 3, rarely 2 or 5, united in a central column or free. *Female flowers*: ovary 3-celled, with 2 ovules in each cell. Styles free or united at the base, more or less 2-lobed. Capsule separating into 2 valved cocci or loculicidally dehiscent. Herbs, shrubs, or trees. Leaves alternate, entire, usually small and distichous, giving the smaller branches the appearance of pinnate leaves, in some American species wholly wanting. Stipules small, usually persistent. Flowers small.

PHYLLANTHUS EMBLICA. (Linn.) A good sized tree wholly glabrous or the smaller branches pubescent, leaves alternate remarkably distichous linear oblong mucronate glabrous about ½ an inch long by 1½ lines broad, petioles scarcely ½ a line long, stipules small scarlose, margin lacerated; *male*, flowers very numerous axillary or below the leaves on pedicels about 1 line long, perianth segments 6, less than one line long, glands small round 1 between each of the segments of the perianth at the base inside, anthers 3-5 oblong erect on a short column which is formed by the conjunction of the filaments; *female*, flowers mixed singly with the males, perianth as in the male, disk cup-shaped half or more than half covering the ovary jagged round the apex and often more or less 3-cleft, style with 3 thick recurved 2-lobed branches, the lobes again bifid, fruit globose succulent smooth 6-striated about 1 inch or a little more in diameter with a hard 3-celled nut which is tardily dehiscent. *Roxb. Fl. Ind.* iii. *p.* 671. Emblica officinalis, *Gærtn.* Dichelactina, *Hance in Walp. Ann.* iii. 376.

This valuable timber tree is most abundant in almost every dry jungle and forest throughout the Presidency, particularly about the lower slopes of mountains, which it ascends to rather over 4000 feet elevation; it is also found in Ceylon, Bengal, Birmah, and Malacca, China, Java, Borneo and Japan, and it is often cultivated in native gardens and about temples. It is called 'Amlà in Hindostanee and Oosree in Teligu, and Nelli in Tamil, the fruit is eaten and made into tarts and pickled, raw they are very acrid but excellent to chew to keep off thirst; the wood is hard, fibrous, and flexible, tolerably close and straight grained, of a red color and durable, unseasoned a cubic foot weighs 58-62 lbs. and when seasoned 46 lbs., and its specific gravity is ·736, it is remarkably durable under water, on which account it is much in use for well rings; it is also much used for building purposes, furniture, gun stocks, and many other purposes, and is adapted for turning; the bark is strongly astringent and is used for tanning, and as a cure in diarrhœa; in the Bombay Presidency the tree is called Awlà.

Analysis.

1. A flowering branch magnified.
2. A leaf and stipule magnified.
3. A male flower bud, sepals imbricate.
4. A full male flower showing the glands in the sinuses at the base of the segments.
5. The column of stamens removed from the flower, 3 anthers (there are sometimes 4 or 5.)
6. The same opened out (it easily separates), showing that the column is formed by the adhesion of the filaments and that the anthers are fixed by the centre of the back.
7. Anthers, front and back view.
8. Female flower showing the style with its 3 recurved branches.
9. The same fully open showing the cup-shaped lacerated disk.
10. Disk opened out showing the ovary.
11. Ovary cut vertically, ovules attached to centre of axis.
12. Ovary cut transversely, 3 cells with 2 collateral ovules in each. (All drawn from living specimens.)



Ferrando del. Dunsey lith.

Phyllanthus Emblica (Linn.)

BISCHOFFIA JAVANICA. (Nat. order Euphorbiaceæ.)

BISCHOFFIA. *Blume.*—GEN. CHAR. Diœcious or sometimes monœcious. *Male*, calyx segments 5 valvate very concave at first enclosing the stamens, afterwards revolute, stamens 5 opposite the segments on short filaments inserted on the pedicel of a large flat peltate inconspicuously 5-lobed fimbriate abortive ovary. *Female*, calyx segments 5 lanceolate slightly imbricate very soon deciduous, ovary 2-3 celled with 2 collateral ovules in each cell attached to the centre of the axis, styles equalling the number of cells in the ovary entire long filiform recurved, fruit a globular drupe enclosing 2-3 indehiscent cocci. A tree, leaves alternate trifoliate rarely 5-foliate, flowers very small the male very numerous in very compound axillary panicles, the female in looser and less branched panicles or racemes. *Blume. Bijdr. p.* 1168. Andrachne, *Roxb. Fl. Ind.* iii. *p.* 728. Microelus, *WA. in Edinb. New Philos. Journ.* 14, 298. Stylodiscus, *Benn. in Horsf. Pl. Jav. rar. p.* 133.

BISCHOFFIA JAVANICA. (Bl.) A very large tree with a tall erect trunk often of great girth, leaves 8-12 inches long of which the common petiole is 3-5 inches, trifoliate or very rarely with 5 leaflets, leaflets membranaceous to coriaceous elliptic ovato-lanceolate or oblong to obovate with a long sudden acumination coarsely crenate, smooth on both sides, 3-6 inches long by 1½-2 inch broad, on short petiolules, stipules membranaceous caducous, stipels minute filiform caducous leaving a black gland-like speck. *Male*, flowers greenish crowded in broad panicles much branched and shorter than the leaves; *female*, flowers in looser and less branched panicles or simple racemes, the flowers, &c. as in the generic character, drupe round smooth of the size of a small cherry. *Blume. Miq. Fl. Ind.* 1. *part* ii. 363. B. trifoliata, *Hook. Ic. Pl.* 1. 844. Andrachne trifoliatus, *Roxb. Fl. Ind.* iii. *p.* 728. Stylodiscus trifoliatus, *Burm.* Microelus Ræperianus, *WA. l. c.*

This very valuable timber tree is rather common throughout the Presidency, being found both on the eastern and western side, in some of our richer tracts it grows to be an immense tree, and it ascends the mountains to 5000 *feet elevation; it also inhabits Northern India, Borneo, the Archipelago, S. China and the Philippines, but appears to be absent from Ceylon; it is the only known species of the genus. It flowers in February and ripens its seed in May and June; the timber is reddish, very hard and durable and much in use in some parts with planters and others for building, planking, &c., but it is very little known or utilized in general, and should receive more attention. In the Madura district and parts of Tinnevelly it is known by the name of Modagerri vembu; and I have known planters using it under the name of red cedar; on the Bombay ghats it is called Boke. From Roxburgh's description the tree is sometimes monœcious, but I have not noticed this myself nor have I observed glands (or staminodia?) in the female flower, or* 4 *styles and* 4 *cells to the ovary, but both apparently occur (vide description in DC. and Roxb.),* 2 *styles and* 2 *cells to the ovary occur in some, panicles nearly in the same proportion as* 3 *styles and* 3 *celled ovaries; the figure here given represents a branch of the female tree and a portion of a male panicle, all drawn from living specimens collected on the Nilgiris; the foliage is very variable, and all DC.'s varieties might be gathered off one and the same tree.*

Analysis.

1. Portion of a panicle from the male tree.
2. A male flower bud, the concave calyx segments partly enclosing the anthers.
3. A male flower more advanced.
4. The same fully expanded, showing the calyx segments revolute and the filaments attached to the pedicel of the abortive ovary or central disk.
5. Anthers, front and back view.
6. Female flower with 2 styles, showing the bract at the base of the pedicel and the lanceolate calyx segments.
7. Ovary of the same cut vertically, showing the ovules attached to centre of axis.
8. Ovary of the same showing only 2 cells and 2 collateral ovules in each cell.
9. Female flower with 3 styles.
10. The same opened.
11. Ovary of the same, showing 3 cells.

Bischoffia Javanica, Blk.

BRIEDELIA RETUSA. (Nat. order Euphorbiaceæ.)

BRIEDELIA. *Willd.*—GEN. CHAR. Flowers monœcious. Calyx 5-lobed to nearly the base valvate in bud, petals 5 small similar or nearly similar in both sexes, or entire in the female, dentate in the male. *Male*, disk single large saucer-shaped adnate to the bottom of the calyx. Stamens 5 inserted round a central style-like column a little below its apex. *Female*, disk double the outer thick and cupular adnate to the wall of the calyx, inner one adnate to the inside of the outer disk very thin membranaceous more or less 5-lobed, the lobes irregularly cut and jagged. Ovary 2-celled ½-enclosed by the double disk, ovules 2 in each cell pendulous from the apex of the axis, styles 2 shortly bifid, fruit globular or ovoid succulent enclosing 2 (or rarely 1) indehiscent cocci. Seed albuminous, radicle very short superior, cotyledons broad flat foliaceous. Trees, shrubs or scandent shrubs, leaves alternate short petioled more on less distichous, the primary veins usually prominent and parallel, flowers in axillary bracteated clusters or from the abortion of the leaves appearing as if in long axillary spikes.

BRIEDELIA RETUSA. (Linn.) A large tree, trunk pretty erect and with the larger boughs occasionally armed, leaves from elliptic or oblong to obovate, bluntly pointed or very retuse or emarginate at the apex, entire or slightly crenulated, more or less coriaceous glabrous above, glaucous sub-glabrous or more or less hairy beneath, primary veins 15-22 parallel rarely forked, very prominent beneath, veinlets prominent and parallel and the venules beautifully reticulated, very variable in size, up to 5½ inches long by 3½ inches broad, petioles 3-4 lines long, flowers greenish yellow in axillary sessile heads or from the abortion of the leaves on the young ramuli in long axillary and terminal spikes collected in sessile heads with the interstices naked, calyx slightly hairy; *male*, staminal column slightly 2-lobed at the apex, petals glabrous broadly ovate dentate, clawed and cucullate at the base, disk flat or slightly concave, anthers attached at the centre of the back at first erect afterwards versatile; *female*, petals lanceolate entire, disk double the outer one thick and cupular subentire or crenulate, the inner membranaceous more or less 5-lobed and much jagged at the margin, ovary, styles, &c. as in the generic character, fruit globular size of a pea succulent black enclosing two indehiscent pyrenes.—Clutia retusa, *Linn. Spec. Pl. Ed.* 1. *p.* 1475. Briedelia retusa, *Spreng.* Briedelia spinosa, *Roxb. Fl. Ind.* iii. 735; et B. crenulata, *l. c. p.* 734.

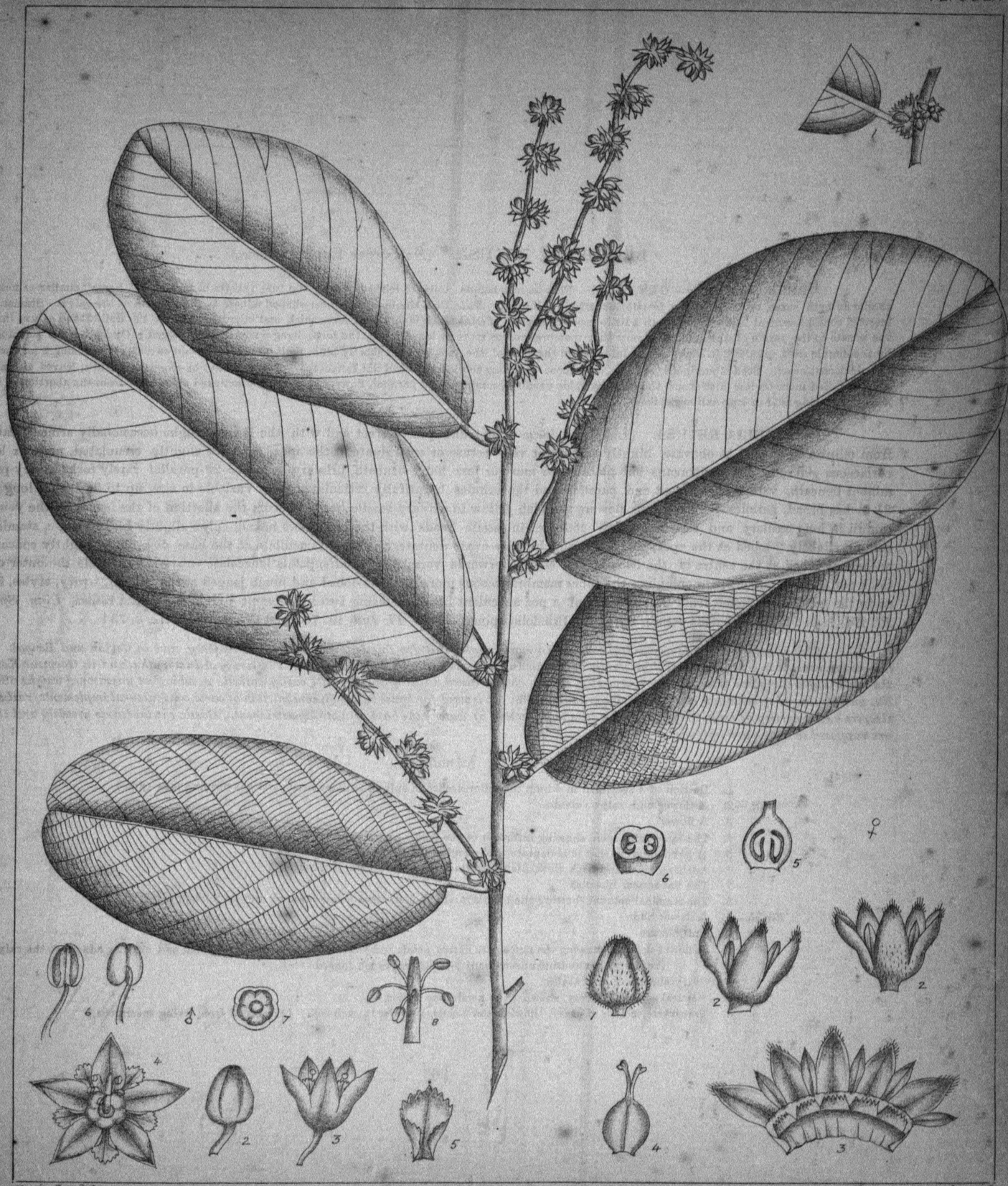
This is a very valuable timber tree common in most jungles and dry forests throughout the Presidency, and in Ceylon and Bengal. On the eastern coast it is known by the Teligu names of Kovâmán, Koramaddi, and Duriamaddi, in Tinnevelly Adamaruthu, and in Goomsur Kosi; the wood is of a dirty red or copper color, very stiff, strong, close-grained and durable, but not easily worked. A cubic foot unseasoned weighs 68-70 lbs. and 60 lbs. when seasoned, and its specific gravity is ·960; it is used for house building, construction of carts, agricultural implements, railway sleepers and a variety of other purposes, and it stands the action of water; the bark is a strong astringent. Cattle eat the leaves greedily and they are supposed to act as a vermifuge.

Analysis.

1. Portion of a specimen in which the inflorescence is only in axillary heads and not forming long spikes.

Male.—2. A flower bud, calyx valvate.
3. A flower.
4. The same fully open, showing insertion of the petals under the disk.
5. A petal showing that it is dentate, and cucullate at the base.
6. Anthers, front and back view, filament attached at the centre of the back.
7. The flat saucer-like disk.
8. The staminal column showing the insertion of the 5 stamens below its apex and its 2-lobed point.

Female—1. A flower bud.
2. Full flowers.
3. A flower opened showing the lanceolate entire petals and the double disk, the outer thick and cupular adnate to the calyx, the inner thin and membranaceous 5-lobed and much jagged.
4. Ovary and the 2 bifid styles.
5. Vertical section of ovary, showing the pendulous ovules.
6. Transverse section of ovary, showing the 2 cells, 2 ovules in each cell. (All drawn from living specimens.)



Bredelia retusa (Linn.)

CEPHALOCROTON INDICUM. (Nat order. Euphorbiaceæ.)

CEPHALOCROTON. *Baill.*—GEN. CHAR. *Male*, calyx valvate 4-3 parted, petals 0, disk 0, stamens 4-8 inserted round the rudiment of an ovary, when in a single row alternate with the lobes of the calyx, when in 2 rows the inner alternate with the outer, filaments free much exserted, anthers fixed by the middle of the back, cells equal adnate their whole length introrse, rudiment of ovary small and filiform or obovoid-cylindric, truncate, or 2-3-cleft. *Female*, calyx 5-8 parted slightly imbricate the segments sometimes pinnatifid, disk 0 or hypogynous, petals 0, ovary 3-celled, cells 1 ovuled, style 3 joined at base into a short or long column, free above and spreading and irregularly twice or 3-times di-trichotomous, the divisions or arms papilloso-asperous, capsule tricoccous 3-seeded or less from 1 or 2 of the cells being abortive, seeds not strophiolate subglobose. Trees or shrubs, with alternate entire or toothed bistipulate leaves, often pellucido-punctate, flowers monœcious the male in compact heads, the female few at the base of the flowering peduncles which are terminal or spuriously axillary or leaf-opposed.—Adenochlæna, *Baill.* Chloradenia, *Baillon.* Adenogynum, *Reichb.*

CEPHALOCROTON INDICUM. (Bedd.) A good sized tree up to 6-7 feet in girth, young parts and young leaves sparingly furnished with mealy stellate pubescence, leaves alternate ovate, oblongo-ovate or almost elliptic entire, more or less pointed and generally mucronate, membranaceous when young, in age subcoriaceous subglabrous except the costa, sometimes inconspicuously dotted on the under side, 2½ to 6 inches long by 1¼-3 broad, the pinnate veins very prominent and raised beneath 5-7 on each side, the veinlets and venules also prominent and reticulated, petioles 1½-1¾ inch long channelled above, inflorescence in terminal spikes 2-3 inches long, all the parts furnished with very short stellate rather mealy pubescence, male flowers very numerous, in dense compact sessile interrupted heads along the whole length of the flowering peduncle, calyx hardly more than ½ a line long 4-parted valvate and quite globose in bud, stamens 4 in a single row round the base of the rudimentary style more than twice as long the calyx-segments, rudiment of the style filiform rather shorter than the segments inconspicuously 2-lobed at the apex; female flowers few at the base of the flowering peduncle 5-6 lines long (including the styles), calycine segments 7-8 lanceolate entire imbricate at the base often unequal in length sometimes with glands on the outside at the base, disk 0, the 3 styles joined into a short or elongated column at the base, free and much spreading above and there each divided into 2 arms which are again bifurcate, all very papilloso-asperous, capsule tricoccous subglobose 9-10 lines in diameter slightly scabrous.—Adenochlæna Indica, *Bedd. in Distrib.*

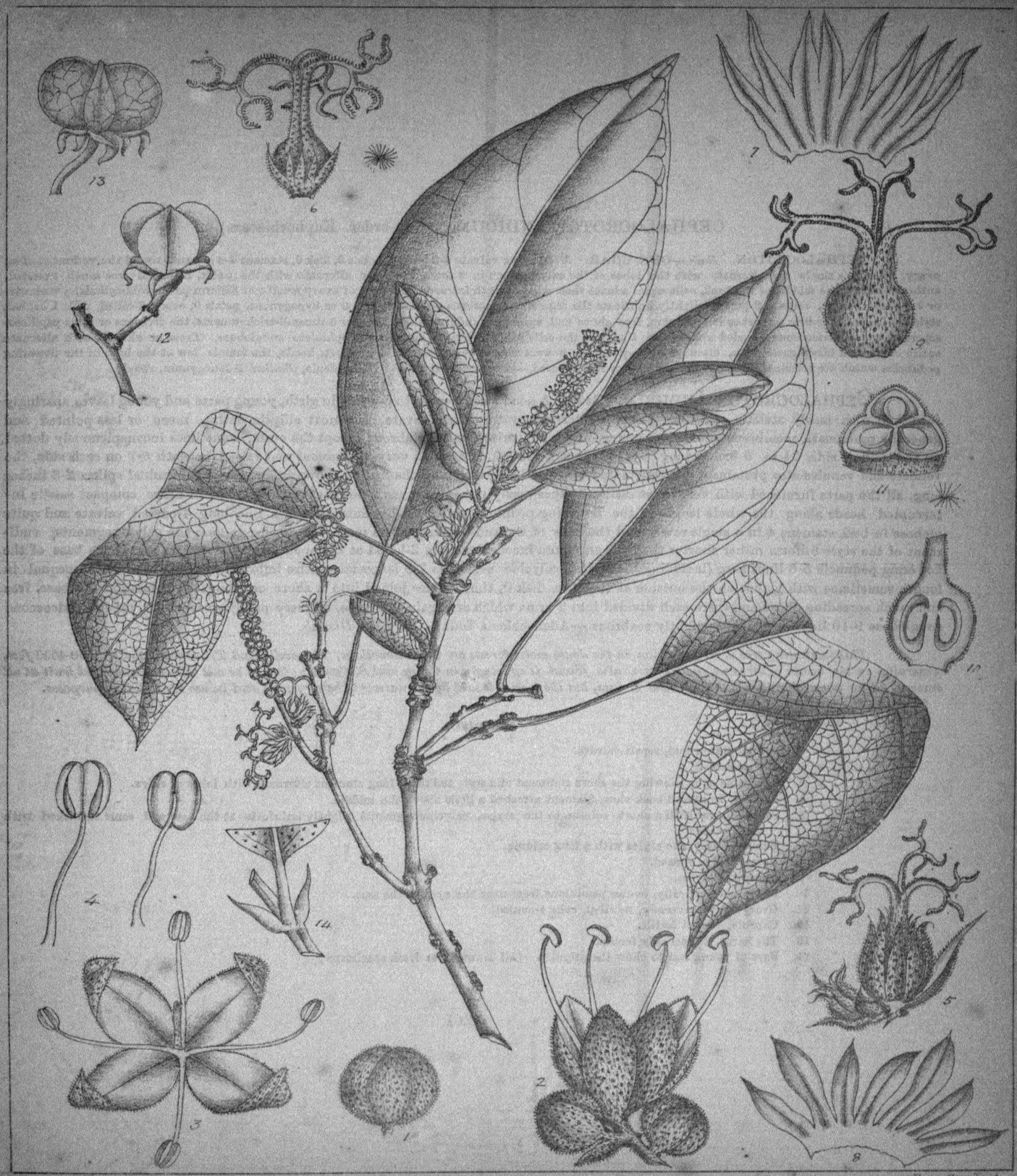
This interesting tree is very common in the dense moist forests on the Anamallays, Tinnevelly and Travancore ghats, 1500-4000 *feet, generally on the banks of streams, and I have also found it sparingly in Coorg and S. Canara; it is to be met with in flower and fruit at all seasons. I am not acquainted with its timber or uses, but the former is said by the natives to be very good and in use for building purposes.*

Analysis.

1. A male flower-bud, sepals valvate.
2. A male flower.
3. The same open showing the short rudiment of a style and the 4 long stamens alternate with lobes of calyx.
4. Anthers, front and back view, filament attached a little above the middle.
5. Female flower with a short column to the styles, calycine-segments slightly imbricate at the base and some furnished with black glands.
6. Female flower, the styles with a long column.

7, 8. Female calyx opened.

9. Ovary and styles.
10. Ovary cut vertically, ovules pendulous from near the apex of the axis.
11. Ovary cut transversely, 3-celled, cells 1-ovuled.
12. Capsule, 3 cocci fertile.
13. The same, 2 cocci only fertile.
14. Base of young leaf to show the stipules. (All drawn from fresh specimens.)



Cephalocroton Indicum (Rxb.)

CINNAMOMUM ZEYLANICUM, variety WIGHTII. (Nat. order Laurineæ.)

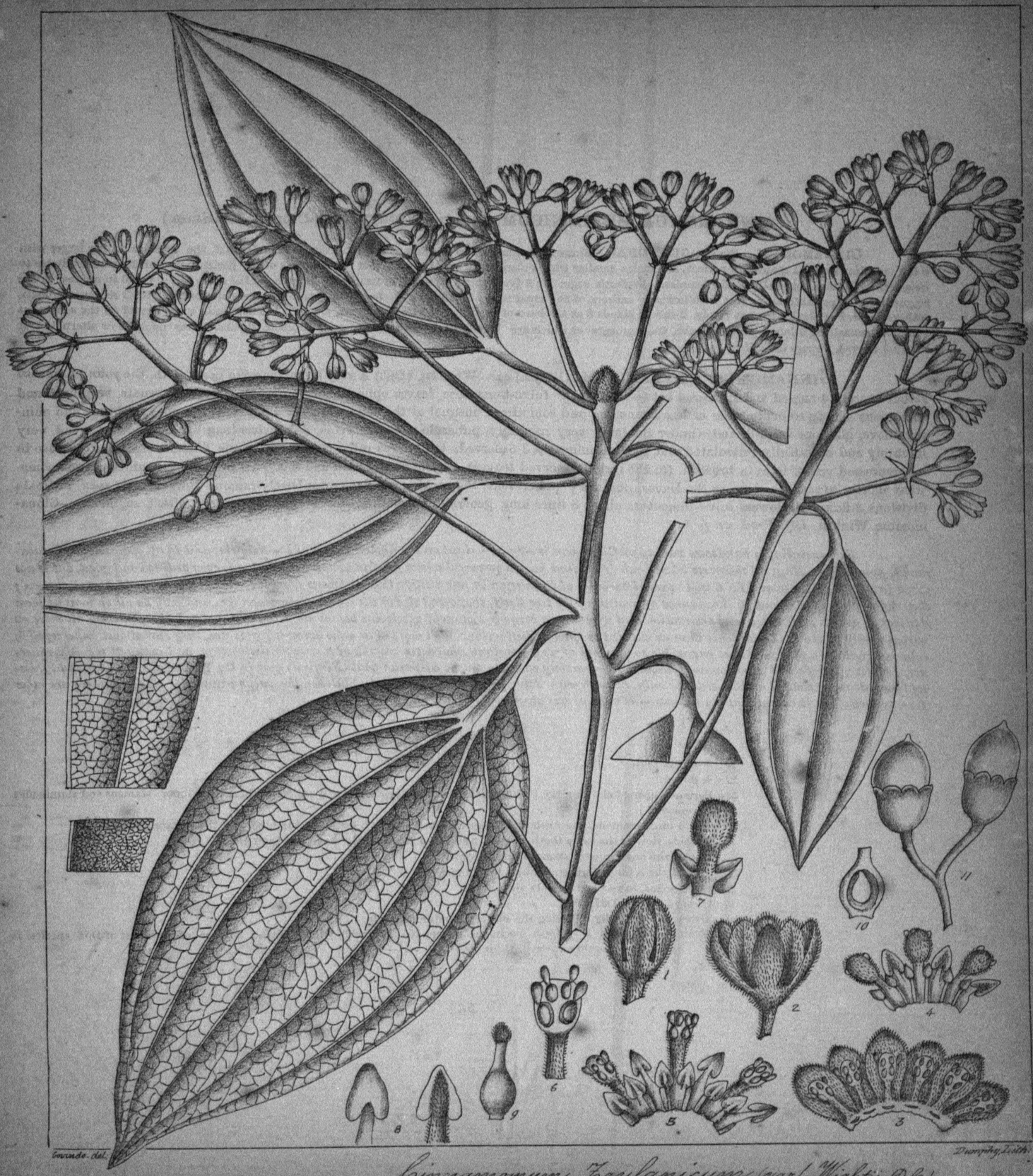
CINNAMOMUM. *Burm.*—GEN. CHAR. Flowers hermathrodite or often with a tendency to be unisexual, the females rather larger with a few sometimes only 1 stamen imperfect, the males smaller with a sterile ovary and the number of the parts of the perianth and of the stamens liable to occasional variation, especially in the females. Perianth segments 6 (very rarely 8) equal or nearly so, stamens of the outer series equal in number to the segments of the perianth all perfect with introrse anthers, of the inner series 3 generally perfect with extrorse anthers alternating with 3 short staminodia, anthers 4-celled or the inner ones rarely 2-celled, glands 6 at the base of the inner perfect stamens, ovary not immersed, berry seated on the somewhat enlarged truncate or 6-lobed perianth-tube, the segments of which are wholly or partially deciduous. Trees or shrubs, leaves opposite or alternate 3-or rarely 5-nerved, flowers in axillary panicles.

CINNAMOMUM ZEYLANICUM. (Breyn.) *var.* WIGHTII. (DC.) A very large tree up to great girth, the young branches rather acutely 4-angled and furrowed between, gemmæ fulvo-tomentose, leaves opposite sub-opposite or quite alternate, very hard and coriaceous elliptic to ovate more or less attenuated and sometimes unequal at the base, obtusely pointed at the apex, glabrous and shining above, glaucous beneath and (under the lens) very minutely puberulous on the veins, 3-5 inches long by 1½-3 inches broad, very minutely and beautifully reticulated and very prominently 3-5 nerved, the nerves often connate for some distance up from the base in a compressed vein 3 lines in breadth, (in the larger 5-nerved leaves), petiole very broad and flat 8-12 lines long, panicles from somewhat shorter to about as long as the leaves, minutely puberulous, the rachis very flat corymbosely-ramous towards the apex, ultimate divisions 3-flowered, flowers fulvo-tomentose about 3 lines long generally hermathrodite, the perianth rarely with 8 segments.—Cinnamomum Wightii, *DC. Prod.* xv. *p.* 11.

This exceedingly handsome variety of Cinnamon is very abundant on the higher ranges of the Nilgiris, and in all sholas about Ootacamund, flowering in May; all the parts when fresh if crushed have a powerful odour of Cinnamon; the timber is even grained and good, but is not much in use. We have some 7 for 8 well marked varieties of Cinnamon in our western (moist) forests from the sea level up to the highest elevations; they differ much in size and in the manner of growth of the tree itself, shape and size of the leaves, pubescence, &c., and may be all or most of them distinct as species; but after long observation and with a very large collection of specimens before me, I am inclined to look upon them all more as varieties only of the C. Zeylanicum than as entitled to specific distinction. Well marked as some extreme forms are, they run almost imperceptibly into one another, and it is almost impossible to lay hold of any constant character worthy of a specific distinction, and many of the differences are, I believe, the effect of elevation and climate. One variety common on the Sisparah ghat (Nilgiris) and in the Wynad about Manantoddy, has its leaves densely clothed on both sides or only beneath with dense yellow tomentum, it is I believe, the sulphuratum of Nees, but there are other forms exactly like it except that the tomentum is more or less absent.

Analysis.

1. A flower bud.
2. A flower.
3. Perianth opened showing the 6 outer stamens with their introrse 4-celled anthers (the inner stamens and staminodes removed.)
4. The 3 inner stamens, the anthers extrorse, filaments with 2 glands at the base, and the 3 staminodes.
5. Outside view of the same (both this fig. and No. 4 more highly magnified than No. 3.)
6. One of the outer row of stamens, inside view.
7. One of the 3 inner fertile stamens, inside view.
8. Staminodes, inside and outside view.
9. Ovary, style and stigma.
10. Ovary cut vertically, showing the solitary pendulous ovule.
11. Fruit. (All drawn from fresh specimens except No. 11 (fruit), which, in the absence of the fruit of this species, is taken from another variety, C. iners.)



Cowarde del. Dunnphy, Lith.

Cinnamomum Zeylanicum (var. *Wightii* DC.)

BEILSCHMIEDIA FAGIFOLIA. (Nat. order Laurineæ.)

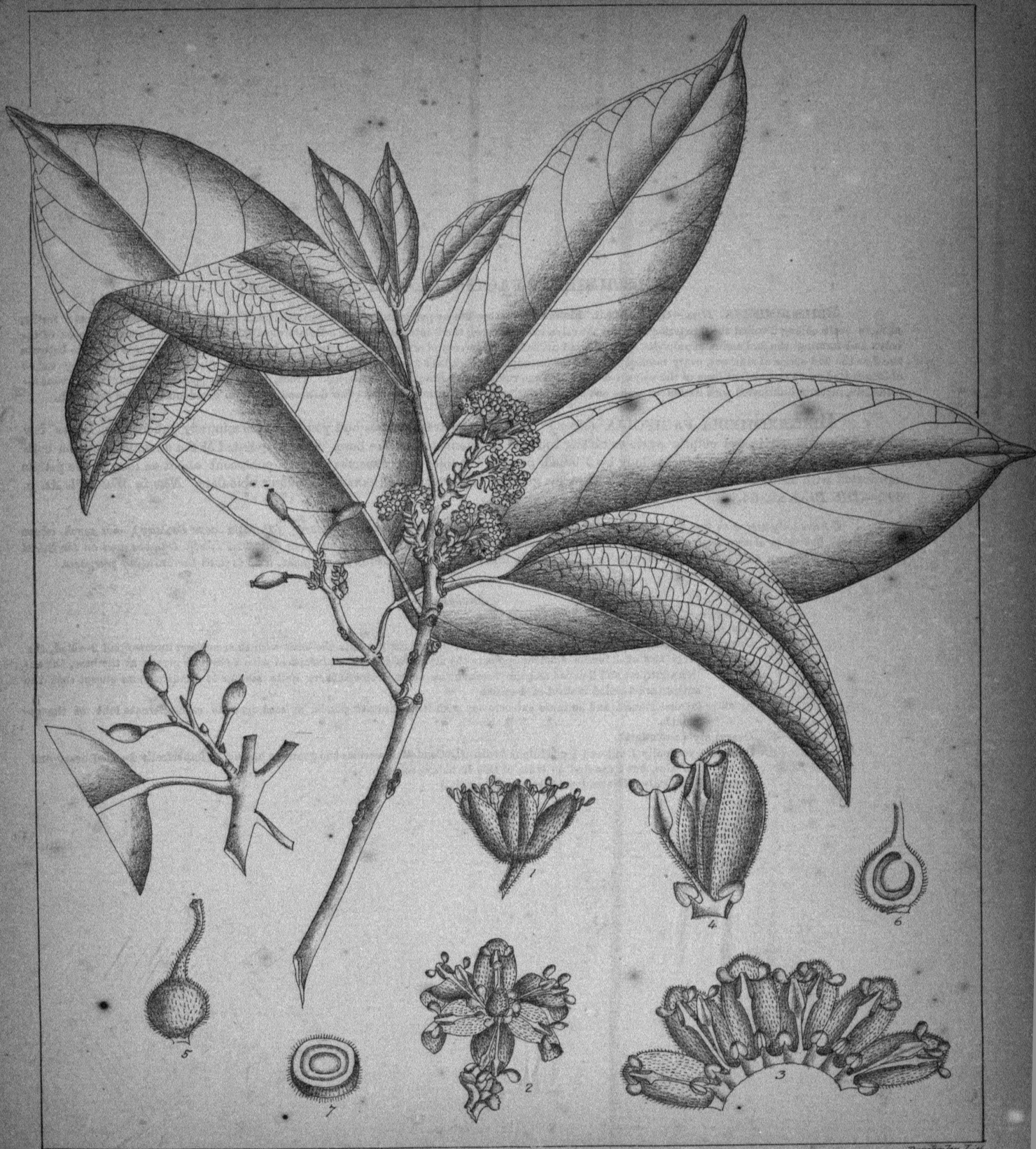
BEILSCHMIEDIA. *Nees.*—GEN. CHAR. Flowers hermathrodite or polygamous, calyx 6-parted, lobes subequal deciduous, stamens 9 fertile, anthers ovate oblong 2-celled the 6 exterior opposite the calyx lobes introrse, the 3 interior with the cells lateral subextrorse, opposite alternate lobes of the calyx and forming the 2nd series, staminodia 3 small ovoid or subsagittate very shortly stipitate forming the inner series, glands 3 or 6 stipitate between the 3 or the 2nd series of stamens, ovary 1-celled 1-ovuled (or incompletely 2-celled ? 3-ovuled ?) style filiform, stigma discoid obtuse, berry dry naked oblong seated on the persistent base of the calyx 1-celled (with the rudiment of the partial partition). Trees, leaves subopposite few penniveined venoso-reticulate, racemes imbricated with deciduous scales and springing from axillary gemmæ, scales 1-few flowered at length deciduous, flowers yellowish.

BEILSCHMIEDIA FAGIFOLIA. (Nees.) A very large tree, gemmæ and young leaves minutely puberulous, leaves few and subopposite coriaceous elliptic ovate or oblong rounded or attenuated at the base, obtusely pointed at the apex, glabrous on both sides and shining above, up to 6 inches long by 3 broad, petioles 6-9 lines long, racemes axillary pubescent about as long as the petiole imbricated with scales at the base, flowers, &c. as in the generic character, fruit (immature) oblong apiculate. *Nees in Wall. Pl. As. p.* 69 ;—*DC. Prod.* xv. 64.

I have only met with this fine tree in the dense moist forests in the plains of South Canara (Parapa near Sooleay), not much above the sea level, but it probably occurs in Malabar and elsewhere in our western forests, and it has been found in North Canara and on the Silhet mountains in Northern India; the tree grows to an immense size, and the timber is said to be very good, and is used for building purposes.

Analysis.

1. A flower.
2. The same open.
3. Calyx (or perianth) opened showing the outer row of 6 stamens opposite the lobes with their anthers introrse and 2-celled, the inner row of 3 fertile stamens opposite the alternate lobes each furnished with 2 stipitate glands at the base, the anthers extrorse and 2-celled and the 3 staminodes or imperfect anthers quite similar to Cinnamomum except that the anthers are 2-celled instead of 4-celled.
4. An outer introrse stamen and an inner extrorse one with its 2 stipitate glands as seen opposite each alternate lobe of the perianth.
5. Ovary, style and stigma.
6. Ovary cut vertically 1 cell and 1 pendulous ovule. (DeCondolle describes the genus as having an imperfectly 2-celled ovary and 3 ovules, but I can find no trace of this in this species.)
7. Ovary cut vertically. (Drawn from specimens in spirit.)



Gomide del.

Dunlopley Lith.

Beilschmiedia fagifolia (Nees.)

MACHILUS MACRANTHA. (Nat. order Laurineæ.)

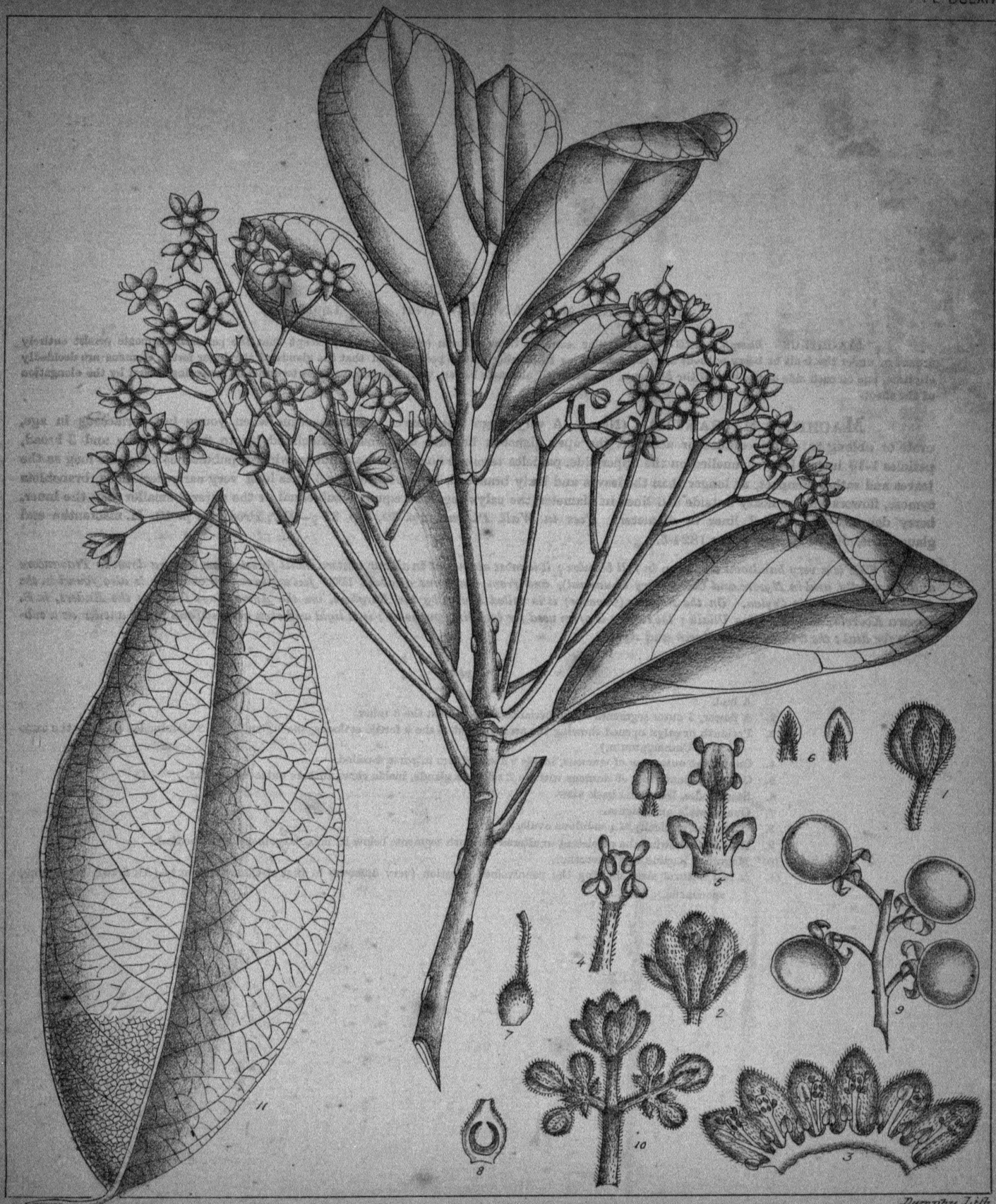
MACHILUS. *Rumph.*—GEN. CHAR. The same as Cinnamomum (vide Pl. cclxii) except that the perianth segments persist entirely around or under the fruit or berry without any enlargement or thickening of the pedicel, and that the glands of the inner fertile stamens are decidedly stipitate, one on each side of the base of the filament. Trees, with alternate leaves, veins pinnate, panicles terminal or becoming lateral by the elongation of the shoot.

MACHILUS MACRANTHA. (Nees.) A very large tree, leaves membranaceous when young but coriaceous in age, ovate or oblong to elliptic obtuse or acute at the apex glaucous beneath and finely reticulated, up to 8 inches long and 3 broad, petioles 1-1¾ inches long channelled on the upper side, panicles terminal hoary with a minute whitish pubescence about as long as the leaves and rather compact, or longer than the leaves and laxly branched, bracts lanceolate 3 lines long very early deciduous, branchlets cymose, flowers yellow hoary outside 4-6 lines in diameter, the calyx segments equal or sub-equal or the outer 3 smaller than the inner, berry depresso-globose 4-7 lines in diameter. *Nees in Wall. Pl. rar.* 2 *p.* 70, 3 *p.* 31 ;—*DC, Prod.* xv. *p.* 40. M. macrantha and glaucescens, *Wight's Icones plates* 1824-5.

This is a very handsome tree when in full blossom ; it is most abundant in all our western moist forests from Canara down to Travancore and Tinnevelly, and in Mysore and Coorg (very abundant), and from elevations of about 1000 *feet up to nearly* 6000 *; it is also found in the Bombay ghats and in Ceylon. On the Nilgiris (Coonoor) it is called Kromà by the Burghers, on the Anamallays Irulî by the Kaders, in S. Canara Koormà, and in Ceylon Ullalu ; the timber is often used for building purposes ; it is light and even grained, and would answer as a substitute for deal ; the tree flowers in March and April.*

Analysis.

1. A bud.
2. A flower, 3 outer segments of the perianth smaller than the 3 inner.
3. Perianth or calyx opened showing the arrangement of the 9 fertile stamens, the 6 glands and 3 staminodes (exactly the same as in Cinnamomum.)
4. One of the outer row of stamens, inside view, anthers introrse 4-celled.
5. One of the inner row of stamens with its 2 stipitate glands, inside view, anthers extrorse 4-celled.
6. Staminodes, front and back view.
7. Ovary, style and stigma.
8. Ovary cut vertically, 1 pendulous ovule.
9. Ripe fruit showing the persistent unaltered perianth segments below it, no enlargement of the pedicel.
10. Magnified portion of inflorescence.
11. A leaf natural size, showing the penniveined venation (very different to that of Cinnamomum.)—(All drawn from living specimens.)



Gomida del. Dumphry Lith.

Machilus macrantha (Nees.)

ORDER LII.—STYRACACEÆ.

Flowers regular, hermaphrodite. Calyx-tube usually more or less adnate to the ovary, the limb 5-or rarely 4-lobed. Corolla regular, deeply divided into as many lobes as the calyx or rarely twice as many, imbricate or valvate in the bud. Stamens usually indefinite, sometimes only twice as many or equal in number to the corolla-lobes, attached in one or more series to the base or within the tube of the corolla, those of the outer series usually alternating with the corolla-lobes. Ovary more or less inferior or rarely quite superior, 2 to 5-celled, with 2 or more ovules in each cell, either all pendulous or the upper ones erect. Style undivided; stigma capitate entire or lobed. Fruit more or less succulent and indehiscent or rarely opening in valves. Seed usually solitary, the embryo in the axis of a fleshy albumen. Trees or shrubs. Leaves alternate, entire or toothed, without stipules. Flowers axillary, solitary or in simple or branched racemes.

This order is only represented in South India by a single genus, Symplocos, which yields a good many trees and shrubs chiefly confined to the mountains; the timber of the different species is scarcely known, but it is very inferior in those which have been examined. Styrax is an Himalayan genus yielding shrubs.

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SYMPLOCOS. Linn.

Gen. Char.: Calyx 5-lobed, adherent, corolla 5-lobed or (in some American species) 6 to 10-lobed, the lobes much imbricate in the bud. Stamens indefinite, usually more than 15, rarely only 12 or 10, filaments filiform; anthers small, ovoid or globular. Ovary more or less inferior, 2 to 5-celled, with 2 or rarely 3 ovules in each cell. Style filiform, entire or shortly lobed at the top. Berry from globular to oblong, crowned by the persistent calyx-lobes, usually with 1 or 2 seeds only. Embryo with a long radicle and very short cotyledons. Trees or shrubs, the specimens almost always taking a yellow tinge in drying. Flowers small, in axillary racemes, or clusters, each one solitary in the axil of a small bract, with 2 bracteoles under the calyx.—Ciponima, *Aubl.* Barberina, *Vell.* Hopea, *Linn.* (not *Roxb.*) Stemmatosiphon, *Polh.* Decadia, *Lour.*

* *Ovary 3-celled.*

1. Symplocos Gardneriana, *Wight.*—For description, &c. see Pl. ccxxxvii.

2. Symplocos spicata, *Roxb.*—A moderate sized tree, quite glabrous; leaves glabrous shining usually oval-elliptical or oblong-elliptical but varying from obovate to lanceolate obtuse or shortly acuminate, entire or irregularly toothed contracted into a petiole, 4-6 inches long by 1-1½ broad; spikes axillary solitary sometimes simple generally branched into a panicle 2-3½ inch long, flowers numerous sessile small scattered yellow, bracts and bracteoles small and very deciduous, calyx 5-lobed, lobes exceedingly short, broad, petals about 1½ lines long cohering in a ring with the stamens which are about 40 in number and sometimes obscurely 5-adelphous, ovary 3-celled with 3-4 ovules in each attached to the axis, style as long as the filaments, stigma large and perforated, fruit a small drupe the size of a pea, short-urceolate contracted at the apex about 12-ribbed olive colored, nut hard and thick conform to the drupe. *Roxb. Fl. Ind.* ii. 541;—*Wight Ill. tab.* 150.

This small tree is the commonest species of the genus in this Presidency, being found everywhere on the western side of the Presidency, Mysore, Shevaroys, &c., and it also extends to Bengal and Ceylon; it ranges from the plains up to 7000 feet elevation. On the Nilgiris it is called Boothgani by the Burghers; the wood is close in grain, light, very deficient in fibre and not durable, it is only used as firewood.

3. Symplocos obtusa, *Wall.*—A small or middling sized tree, all the parts perfectly glabrous except the margin of the calyx which is ciliated, leaves coriaceous oblong or obovate to suborbicular quite rounded at the apex or very shortly acuminate, attenuated or quite rounded at the base, inconspicuously toothed, 3-7 inches long by 1-3 inches broad, veins prominent beneath, petiole ½ to 1 inch long, bracts very early caducous, racemes axillary about 2 inches long simple, flowers few very shortly pedicelled, calyx obconical, lobes rounded, fruit oblong. *Wall. DC. Prod.* viii. *p.* 255;—*Wight Icones tab.* 1233.

A common tree on the Nilgiris and Anamallays 5-7000 feet elevation, also on the Ceylon mountains; very variable in the size and shape of its leaves.

4. Symplocos nervosa, *DC.*—A tree, branches terete marked with numerous elevated scars of fallen leaves, leaves ovate-lanceolate to elliptic acute or somewhat acuminate, membranaceous to coriaceous, serrato-dentate, glabrous except a few scattered hairs on the costa and rarely on the primary veins beneath, 2-3 inches long by 1¼-1½ broad, petioles 3-4 lines long slightly hairy, racemes axillary several congested on the ends of the branches, about twice as long as the petioles hairy, flowers crowded sessile, calyx tube short glabrous, lobes equal or subequal, ovate obtuse hairy on the back, corol glabrous about as long as the stamens, ovary hairy 3-celled with 2 ovules in each cell, 1 suberect and small, the other long and pendulous, berry oblong 6 lines long crowned with the base of the calyx lobes. *Wight Icones tab.* 1235. S. Hamiltoniana, *Wall. in DC. l. c. p.* 254?

Variety β. hirsuta: S. hirsuta, *Wight and Gardn.*;—*Thw. En. Pl. Zey. p.* 185. Ceylon.

Nilgiris, very common about Ootacamund, in flower in February. A large tree, timber very perishable and not used except for firewood. Variety β. I only have from Ceylon; it has exactly the same foliage, and only differs in the inflorescence being much more hirsute and by the ramuli being occasionally somewhat hispid. S. foliosa, *Wight Icones tab.* 1234, is the same plant, at least I have failed to find any difference: the vertical sections of the ovary in both plates, 1834 and 1835, are wrong; in the former 3 pendulous ovules are represented, and in the latter a solitary pendulous ovule. I have always found 2 ovules, 1 small and suberect, near the apex of the cell; the other long and pendulous and attached at nearly the same point.

5. Symplocos pulchra, *Wight.*—A shrub, ramuli, leaves, racemes, pedicels and bracts clothed with long brownish hairs, leaves oval to ovate or narrow ovato-oblong generally with a longish very finely pointed acumination rarely rounded at the apex, often somewhat cordate at the base, sharply serrated with the teeth and margin setose, up to 7 inches long and 2¼ broad, petioles

2-3 lines long, racemes filiform 1-2½ inches long, 2-4 flowered, flowers large pure white 10-11 lines in diameter, calyx lobes ciliate, corol glabrous, stamens very numerous, ovary pubescent 3-celled. *Wight Icones tab.* 1230.

This very lovely shrub is very common on the Sisparah ghat, Nilgiris, 3-4000 feet elevation, but I have never met with it elsewhere. Wight's figure is very good except that he leaves out the very long dense hair that covers the branches copiously and the leaves more sparingly.

6. Symplocos microphylla, *Wight.*—A much branched glabrous shrub 6 feet high, leaves elliptic obtuse serrated coriaceous glabrous or with a few hairs on the costa beneath, 1-1½ inches long by 8-10 lines broad, petioles 3 lines long, racemes axillary 6-9 lines long pilose 3-6 flowered, bracts ovate obtuse pubescent, calyx-segments suborbicular pubescent and ciliate, corol about as long as the very numerous stamens, ovary 3-celled, cells 2-ovuled. *Wight Icones tab.* 1232.

Nilgiris, Avalanche, 6-7000 feet elevation.

7. Symplocos monantha, *Wight.*—A much branched glabrous shrub, leaves elliptic with a tapering acumen serrated, 1½-2 inches long by about 8 lines broad, petioles 3 lines long, flowers axillary solitary sessile, 3-4 lines in diameter, calyx glabrous, segments ovate pointed much shorter than the corol hairy along the centre of the back and ciliate at the margins, corol-lobes roundish obovate as long as the numerous stamens, ovary 3-celled, with 3 ovules in each cell. *Wight Icones tab.* 1236.

Tinnevelly mountains.

8. Symplocos Anamallayana, *Bedd.*—A small tree, everywhere glabrous, leaves ovate to sub-orbicular with a short obtuse point, very coriaceous shining, serrulate in the upper half, 1½ to 1¾ inches long by about 1 inch broad, petioles about 1 line long, peduncles simple axillary solitary or 2-3 together, about 1 inch long furnished with 2 bracts at the base of the calyx, flowers small white, calyx lobes acute about 1-3rd the length of the corol, corol lobes rounded, ovary 3-celled, with 2 pendulous ovules in each cell, fruit narrow oblong ½ to ¾ inch long.—Symplocos uniflora, *Bedd. in Linn. Trans. vol.* xxv. *(*not *Benth.)*

Anamallays, 5-6000 feet elevation. *Bedd. Icones tab.* cxvi.

9. Symplocos acuminata, *Bedd.*—A small tree or large shrub, young shoots, peduncles, and bracts minutely hairy otherwise quite glabrous, leaves elliptic lanceolate attenuated at the base and furnished with a very long acuminated point, subentire or with a few very inconspicuous distant teeth in the upper half, about 4 inches long by 1½-1¾ broad, racemes slender axillary or supra-axillary slightly hairy as are the bracts, 1-2 inches long, bearing several pedicelled white flowers, calyx-lobes rounded or subacute, ½ shorter than the corol, flowers ½ an inch in diameter, corol-lobes obtuse, ovary 3-celled with 2 pendulous ovules in each cell.

Wynad, very common on the top of the Brumagherries, elevation 5000 feet, also on the Tirrihoot peak at a less elevation. *Bedd. Icones tab.* cxvii.

10. Symplocos rosea, *Bedd.*—A large shrub, with small rose-colored flowers, young branches, petioles, and inflorescence hairy, leaves elliptic oblong to lanceolate, slightly attenuated at the base and furnished with a longish sharp acumination, very finely but sharply serrated except at the base, glabrous above, glabrescent beneath or furnished with a few hairs on the costa and veins, 5-6 inches long by 1½-2½ broad, petioles about 4 lines long, racemes axillary 1-3 inches long very hairy as are the deciduous bracts and the calyx, calyx-lobes acute about ½ as long as the corol, corol-lobes obtuse glabrous, ovary 3-celled, cells 2 ovuled, ovules pendulous, fruit oblong about ½ an inch long, puberulous. *Bedd. in Linn. Trans. vol.* xxv.

Anamallays, moist woods, 2000 to 4000 feet elevation. *Bedd. Icones. tab.* cxv.

11. Symplocos oligandra, *Bedd.*—A small or middling sized tree, much branched, gemmæ and young parts minutely puberulous, leaves coriaceous elliptic shortly pointed or rarely obtuse, glabrous on both sides shining above pale beneath, quite entire or with a very inconspicuous tendency to crenation near the apex, about 2 inches long by 8 lines broad, petioles 2-3 lines long channelled on the upper side and puberulous; racemes puberulous very short scarcely longer than the petioles 3-6 flowered, calyx puberulous scarcely a line long, segments unequal, corol glabrous about twice as long, stamens as long as corol 12 (rarely only 10-11) generally hexadelphous in pairs, or irregularly pentadelphous in bundles of 2-3 or 4, the others solitary, ovary 3-celled, ovules 2, the upper one very small suberect the lower long and pendulous, fruit not seen.

Tinnevelly and Travancore ghats, 3000-5000 feet elevation; the species differs so from all the others in its stamens that I have been induced to give dissections of the flowers.

Analysis of Genera, Pl. XX, fig. 1.

1. A flower bud.
2. A full flower, corol 5-parted to nearly the base, lobes imbricate.
3. A corol opened, showing only 12 stamens regularly 6-adelphous, in pairs adnate to the inside of the very short tube of the corol.
4. A corol opened, showing 12 stamens irregularly pentadelphous.
5. A pair of the stamens removed.
6. Anthers, front and back view, filament attached to centre of back.
7. Calyx, style, and 3-lobed stigma.
8. Ovary cut vertically, 2 ovules in each cell, 1 very small, the other long and pendulous.
9. Ovary cut transversely, showing the 3 cells.

12. Symplocos rufescens, *Thw.*—A glabrous tree, branches angled, leaves oblong-lanceolate, shortly and obtusely acuminate acute at the base inconspicuously venose, obscurely crenulate and denticulate above the middle, 1½-4 inches long by 3¾-1½ broad, reddish when dry, petiole 2-3 lines long, racemes simple much shorter than the leaves, bracts small roundish glabrous

but ciliate at the margin early deciduous, bracteoles oblong a half shorter than the calyx subpersistent glabrous but ciliate, the lower flowers pedicellate, calyx-lobes rounded a little acute glabrous except the ciliate margin. *Thw. En. Pl. Zey. p.* 184.

Ceylon, Ambagamwa district, closely allied to S. spicata, and perhaps only a variety of it.

13. Symplocos læta, *Thw.*—A glabrous tree, branches terete striated, leaves ovato-lanceolate acuminate obscurely denticulate acute at the base, sparingly but prominently venose beneath, 1½-4 inches long by 6-16 lines broad, petioles 3-8 lines long; racemes about equal in length to the leaves or a little shorter, naked towards the base, flowers sessile or the lower ones very shortly pedicellate, bracts glabrous small oblong, bracteoles wanting, calyx glabrous except the ciliate margin, tube obconical, segments rounded subacute, fruit oblong. *Thw. En. Pl. Zey. p.* 184.

Ceylon, not uncommon in the more elevated forests of the Central Provinces.

14. Symplocos bractealis, *Thw.*—A glabrous tree, branches terete striated, leaves ovate or ovato-lanceolate acute glanduloso-serrate, closely venose, obtuse or subacute at the base, 1½-4 inch long by 1-2 inch broad, petiole 1-2½ lines long, racemes shorter than the leaves, flowers subsessile, bracts rounded 2-3½ lines long glabrous with a ciliate margin deciduous, bracteoles oblong large glabrous except the ciliate margin deciduous, calyx glabrous, lobes rounded, fruit oblong. *Thw. En. Pl. Zey. p.* 185.

Ceylon, forests of the more elevated parts of the Central Provinces.

15. Symplocos elegans, *Thw.*—A tree, branches terete more or less rufo-tomentose, leaves membranaceous closely venose oblong or ovate, acutely acuminate subentire or obscurely serrulate, above glabrous or pilose at the base of the costa, beneath more or less pilose, rounded or subacute at the base, 1-3½ inches long by ½-1½ inch broad, petiole more or less pilose 1½-2 lines long; racemes shorter than the leaves pilose, bracts and branches externally pilose, calyx glabrous except the ciliate margin, berry oblong subampulliform 5 lines long. *Thw. En. Pl. Zey. p.* 185.

Ceylon, central provinces 5000-7000 feet elevation, closely allied to S. nervosa, var. hirsuta, but differing in its much more acuminate leaves and different character of the pubescence.

16. Symplocos hispidula, *Thw.*—A tree, branches subterete a little angled more or less hispid, leaves membranaceous, closely venose, entire or obscurely denticulate, obovate or oblong abruptly and shortly acuminate, rounded sub-cordate or rarely subacute at the base, above a little pilose or glabrous, beneath pilose, 2½-7 inches long by 1½-3½ inches broad, petioles 2-4 lines long pilose, racemes shorter than the leaves hispid, flowers shortly pedicellate, bracts, bracteoles and calyx externally pilose, fruit subcylindric pilose 5-6 lines long. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Ambagamwa and Saffragram districts, 3000-5000 feet elevation.

17. Symplocos jucunda, *Thw.*—A tree, branches terete fulvo-tomentose, leaves membranaceous or subcoriaceous entire or obscurely and distantly denticulate with a long acumination, and rounded at the base, above glabrous or a little pilose, beneath tomentose and closely venose, 2½-6 inches long by 1-2 inch broad, petioles 2-3 lines long tomentose; racemes tomentose shorter than the leaves, bracts, bracteoles and calyx externally tomentose, flowers shortly pedicellate, fruit subcylindric pilose 6-7 lines long. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Delttotte and Saffragram, 3000-4000 feet elevation.

This and the last are allied to S. nervosa, var. hirsuta, but differ in the shape of the leaves and in the character of the pubescence.

18. Symplocos acuta, *Thw.*—A tree, branches terete, the young ones densely adpresso-pilose, leaves chiefly at the apex of the branches subcoriaceous entire, oblongo-lanceolate acute gradually narrowed at the base into the short petiole, above glabrous channelled at the costa and primary veins, beneath adpressedly pilose on the costa and veins and closely venose, 3-6 inches long by ¾-1½ inch broad, petiole pilose 2-3 lines long, racemes short tomentose, flowers subsessile, calyx lobes pilose, berry elongate subcylindric 6-7 lines long pilose. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Pasdoon Corle, at no great elevation.

19. Symplocos cordifolia, *Thw.*—A tree, leaves chiefly at the apex of the boughs glabrous subcoriaceous obovate obtuse or very shortly acuminate narrowed at the base, auriculato-cordate, closely venose glandulose-denticulate, 3-6 inches long by 1¾-3½ inches broad, petioles 1-2 lines long, racemes tomentose shorter than the leaves, bracts and bracteoles large externally tomentose, calyx tube glabrous, segments externally tomentose, berry oblong glabrous crowned with the tomentose lobes of the calyx. *Thw. En. Pl. Zey. p.* 187.

Ceylon, Central Provinces, 6000-7000 feet elevation.

20. Symplocos marginalis, *Thw.*—A tree, branches terete and with the petioles and racemes densely ferrugineo-tomentose, leaves chiefly at the apex of the boughs coriaceous entire oblong abruptly and very shortly acuminate, subacute at the base, above glabrous except the margin and base of the costa, beneath tomentose and closely and prominently venose, 3½-7 inches long by 1¾-3½ broad, petiole 3-5 lines long, calyx tomentose. *Thw. En. Pl. Zey.* 187.

Ceylon, Ambagamwa district.

21. Symplocos apicaulis, *Thw.*—A very small tree, erect sparingly branched, branches strigose or glabrous terete, leaves rather verticellate at the ends of the boughs, membranaceous glabrous on the costa strigose subentire minutely denticulate closely venose, oblongo-lanceolate acute, 5-15 inches long by 1½-5½ inches broad, petioles 2-3 lines long glabrous or strigose,

racemes much shorter than the leaves, axillary or at the old axils hirsute, flowers subsessile, bracts, bracteoles and calyx externally pilose, berry oblong pilose 6-7 lines long. *Thw. En. Pl. Zey. p.* 187.

Variety strigosa.—Branches strigose, leaves acute or subacute at the base, costa and petiole strigose.

Ceylon, Reigam Corle.

Variety B. glabrifolia.—Branches glabrous, leaves larger glabrous gradually narrowed downwards from above the middle abruptly obtuse at the base.

Ceylon, in the Singhe rajah forest between Galle and Ratnapura, in wet places at no great elevation.

22. SYMPLOCOS CORONATA, *Thw.*—A tree, branches terete ferrugineo-tomentose, leaves coriaceous oblong acute at both ends serrulate, closely venose, above glabrous, beneath tomentose, 5-9 inches long by 2-4 broad, petiole 2-4 lines long tomentose, racemes in the old axils tomentose much shorter than the leaves, flowers crowded sessile, bracts, bracteoles and calyx externally pilose, berry ovoid pilose 4-5 lines long. *Thw. En. Pl. Zey. p.* 187.

Ceylon, Central Provinces, 2-4000 feet elevation.

* * *Ovary 2-celled.*

23. SYMPLOCOS PENDULA, *Wight.*—A small tree, gemmæ and young parts minutely puberulous or glabrous, leaves coriaceous glabrous venose, shining above paler beneath, subentire or with an inconspicuous distant crenation, oblong or elliptic to obovate or obovato-oblong, rounded emarginate or subacute at the apex, 2-3½ inches long by ¾-1½ broad, petioles glabrous or with a few inconspicuous hairs 2-3 lines long, peduncles axillary or from the old axils solitary or twin minutely pubescent, 2-3 lines long 1-flowered (always?) furnished with several ovate blunt ciliate bracts, flowers drooping 6-8 lines long, calyx with its segments very blunt and ciliate, stamens numerous in about 3 series, filaments very flat contracted at the apex just below the anther, stigma large peltate, ovary 2-celled, ovules 2 superposed, fruit narrow oblong 7-8 lines long. *Wight Icones tab.* 1237.

Anamallays and Pulneys 5000-6000 feet elevation, very common; Travancore hills (Attraymallay, 4000 feet); Ceylon mountains. The Travancore specimens have much smaller leaves, narrow-obovate and emarginate, but do not otherwise differ. Wight figures the peduncles as 1-flowered, but describes them as 2-4 flowered; all my specimens have them 1-flowered only. The plant dries to a reddish green (particularly the petioles and young leaves) with only a slight tint of yellow.

I have another tree of this genus; it is very similar to S. spicata, but with much larger and more hairy bracts and bracteoles; it is perhaps only a variety of that species; it is very common in Coorg.

ORDER LIII.—JASMINEÆ.

Flowers regular. Calyx free, usually small, the limb of 4 or 5 or rarely more teeth or lobes or rarely truncate and entire. Corolla with a long or short tube, and 4 or 5 or rarely more lobes, or divided to the base into 4 petals or rarely 2-petaled or wanting. Stamens 2, adhering to the base of the corolla on opposite sides of the ovary, the filaments usually short; anthers 2-celled, the cells opening in longitudinal slits. Ovary 2-celled, with 2 or rarely 1 or 3 ovules in each cell, laterally attached in the young state, but becoming pendulous or ascending accordingly to the growth of the ovary. Fruit succulent or capsular, entire or 2-lobed, 2-celled or reduced to a single cell and seed. Seeds with or without albumen, embryo straight. Trees or shrubs, sometimes climbing, very rarely herbs. Leaves opposite or very rarely alternate, entire or pinnate. Flowers in axillary or terminal panicles, sometimes reduced to short simple racemes or sessile clusters.

Sub Order I, Jasmineæ.—Corol 5 or more lobed, ovules ascending, fruit 2-lobed... ... ... NYCTANTHES.

Sub Order II, Oleineæ.—Corol lobes or petals 4, ovules pendulous, fruit entire.

Corol with a short tube and 4 lobes.
Seed albuminous.
Fruit a drupe, panicles axillary ... ... OLEA.
Fruit a berry, panicles terminal ... ... LIGUSTRUM
Corol with its 4 petals distinct or connected in pairs by the stamens, fruit a drupe exalbuminous ... CHIONANTHUS.

Not an order of much importance in a forest view; the Suborder Jasmineæ only gives 1 small tree, the Nyctanthes, much cultivated all over India, but it yields numerous climbing species of Jasminum and one of Chondrospermum, a large creeper (Anamallays), not coming within this work. The Sub-order Oleineæ is represented by some 16 trees and shrubs belonging to the genera Olea, Ligustrum, and Chionanthus, and some yield good timber. The genus Schrebera, which I have placed near Bignoniaceæ, yields a fine timber tree and is sometimes referred to this order.

NYCTANTHES. JUSS.

For Gen. Char. see letter-press to Pl. ccxl.

1. NYCTANTHES ARBOR TRISTIS, *Linn.*—For description, &c. see Pl. ccxl.

OLEA. TOURN.

For Gen. Char. see letter-press to Pl. ccxxxviii.

1. OLEA GLANDULIFERA.—For description, &c. see Pl. ccxxxviii.

2. OLEA LONOCIEROIDES, *Wight.*—A small tree, leaves narrow elliptic with a long tapering obtuse point entire glabrous, somewhat coriaceous, 3½-4 inches long by 1-1½ broad, veins not very conspicuous with the looping distant from the margin, petioles

3-4 lines long axillary, peduncles much shorter than the leaves trichotomous each division terminating in a head of sessile flowers or the lateral divisions 1-flowered, calyx 4-parted ciliate, corol deeply 2-parted the 2 lobes again bifid but not so deeply, the 4 lobes long linear subulate, the 2 stamens inserted on the tube below the shorter sinuses, ovary ovate, style short 2-cleft at the apex, ovules pendulous, drupe oblong bony 1-seeded, seed albuminous, albumen horny, embryo foliaceous nearly as long as the albumen *Wight Icones tab.* 1241.

I have only observed this small tree on the Tinnevelly ghats, 1000-3000 feet elevation.

3. Olea polygama, *Wight.*—A small tree, polygamo-diœcious, leaves lanceolate or oblong to obovate with a sudden acumination entire coriaceous, glabrous, 3-4 inches long by 1¼-1¾ broad, petioles 4-6 lines long, venation not very conspicuous slightly channelled or impressed on both sides, panicles cymose shorter than the leaves many flowered in the male, fewer in the hermathrodite, calyx segments ovate acute sub-glabrous, corol glabrous with a long tube and 4 very short lobes the margins of which are inflexed, stamens on very short filaments at the base of the tube, anthers fixed by the middle of the back, ovary ovate, style short but distinct, stigma large capitate, ovules pendulous. *Wight Icones tab.* 1239-40.

Nilgiris, west side. I have only got specimens of the hermaphrodite tree from which the description is chiefly taken.

4. Olea Roxburghiana, *Rœm. and Sch.*—A small or middling sized tree, leaves oblong attenuate at the base entire waved smooth on both sides firm, about 5 inches long and 2 broad, petioles 1½ inch long, smooth flat above, panicles axillary or below the leaves small lax many flowered, bracts small nearly sessile, flowers white, corol-tube short, lobes deep, stigma 2-cleft, ovules pendulous, fruit small oblong purple.—Olea paniculata, *Roxb. Fl. Ind.* i. 105 *(not Br.)* O. Roxburghii, *Spreng. Syst.* i. *p.* 34

Common on our eastern mountains, but I have never found it on the western side of the presidency; its timber is serviceable

5. Olea dioica, *Roxb.*—A pretty large tree, diœcious, leaves elliptic tapering at both ends glabrous on both sides, remotely and rather acutely serrate, 4-8 inches long by 2-4 broad, petioles 4-6 lines long; panicles axillary 3-4 inches long, the branches very slender and cymose towards the apex, male flowers glabrous very small, buds quite globose, corol with the tube longer than the very short lobes, no rudiment of an ovary, female flowers not seen. *Roxb Fl. Ind.* i. *p.* 106.

I have only met with this tree on the South Canara ghats and have only male specimens; the nearly open globose buds are only a ¼ of a line in length It is called Mudla (in the Condapore and Udapi taluqs); it answers tolerably well to the description of Roxburgh's tree; it yields a valuable strong timber.

6. Olea Gardneri, *Thw.*—A small tree 12 feet high, glabrous, leaves aggregated towards the apex of the branches, coriaceous entire ovate or oblong more or less acuminate or rounded, acute at the base sparingly venose, 1-2½ inches long by ½-1½ inches broad, petiole 2-3 lines long, cymes pedunculate 3-9 flowered, rarely many-flowered, axillary or below the leaves, pedicels about as long as the leaves, calyx acutely 4-lobed, corol white 1 line long campanulate 4-parted to the middle, lobes rounded, stamens included, fruit round size of a pea, the putamen thin. *Thw. En. Pl. Zey. p.* 188.

Ceylon, Central Provinces 5000-8000 feet.

The Olive *(Olea Europæa)* has been introduced on the Nilgiris.

LIGUSTRUM. Linn.

Gen. Char.: Calyx small 4-toothed, corol with a short tube and 4 lobes valvate or slightly imbricate in the bud, ovules 2 in each cell of the ovary pendulous, style short, fruit a berry, seeds 4 or fewer, albumen copious fleshy or almost cartilaginous Trees or shrubs, leaves opposite entire, flowers rather small white in terminal trichotomous panicles.

This genus is distinguished from Olea in its endocarp being scarcely or not at all hardened (i. e., the fruit being a berry instead of a drupe) and in its inflorescence being always terminal instead of axillary Several shrubs or small trees of this genus have been introduced into our gardens from Japan and China.

1. Ligustrum robustum, *Roxb.*—A tree generally of small size, young branches glabrous furnished with numerous brown or whitish specks or warts, leaves elliptic acute at both ends entire coriaceous glabrous, 3-4 inches long by 1-1½ broad, panicles large, terminal diffuse pubescent, bracts lanceolate pubescent soon deciduous, flowers white fragrant, calyx truncately 4-lobed glabrous or subglabrous, corol deeply 4-cleft, stigma clavate, apex flat and emarginate, fruit size of a bean dark-purple generally 1-seeded.—Phillyrea robusta, *Roxb. Fl. Ind.* i. 101. Visania robusta, *DC. Prod.* viii. 289. Olea robusta, *Wall. Cat.* 2822.

This tree is common in alpine jungles on the west side of this presidency, and in Bengal and Ceylon, and is found in Java; it is in flower all the year round; the wood is very hard and durable and useful for turnery purposes; it is generally of small size in this Presidency. Pieces of the bark are put into the toddy of Caryota urens to make it ferment.

2. Ligustrum Perottetii, *DC.*—A small tree or large shrub, glabrous or the young parts puberulous, leaves elliptic to ovate coriaceous glabrous acute or cuspidately acuminate at the apex, 1-2 inches long by ½-1½ broad, petioles 3 lines long; panicles thyrsiform terminal lax or more or less compact, flowers fragrant, ovules pendulous, fruit oblong obtuse at both ends about as large as a small bean. *DC. Prod.* viii. *p.* 294. Ligustrum Perottetii and Neilgherrense, *Wight Icones tab.* 1244 & 1243.

Common on our higher mountains, Nilgiris, Anamallays and Pulnies, &c.; it is probably not distinct as a species from L. Nepalense, *Wall*, and is also closely allied to L. robustum; they might all, and perhaps some others, be reduced to varieties of one species.

Analysis, Pl. XIX, fig. 5

Ligustrum Perottetii.

1. Apex of a branch showing the terminal inflorescence (life size.)
2. Portion of a branch of a panicle.
3. A flower.

4. Corol opene , showing its 4 lobes and 2 stamens.
5. Calyx, ovary, style and stigma.
6. Anthers, front and back view.
7. Ovary cut vertically, showing the pendulous ovules.
8. Ovary cut transversely, showing the 2 cells.
9. Fruit.

3. LIGUSTRUM MICROPHYLLUM, *Bedd.*—A shrub, young branches rather densely pubescent, leaves ovate or subelliptic glabrous submembranaceous sharply pointed at the apex, 4-9 lines long by 3-5 lines broad, or rarely up to 12 lines long, petioles 1½-2 lines long, panicles pubescent terminal about 2½ inches long, the branches very distant and few flowered, calyx truncated or very inconspicuously lobed glabrous, corol glabrous less than a line long 4-cleft about ⅓ down, stigma 2-cleft, ovules pendulous, fruit not seen.

Coorg, about Kiggatnad. It is bold to propose a new species of Ligustrum; this very minute leaved form is quite unlike anything described, and is constant; it is very like a miniature form of the preceding 2 species, but if a variety of either, is most marked and curious.

CHIONANTHUS. LINN.

For Gen. Char. see letter-press to Pl. ccxxxvii.

1. CHIONANTHUS INTERMEDIA, *Wight.*—For description, &c. see Pl. ccxxxvii.

2. CHIONANTHUS MALABARICA, *Wall.*—A small tree, young parts adpressedly pilose, leaves elliptic to obovate obtuse cuneately attenuated at the base, glabrous on both sides membranaceous to coriaceous obtuse or more or less pointed, sometimes with a long tapering acumen 3-6 inches long by 1-2¼ broad, petioles 2-6 lines long; inflorescence varying from a simple umbellate peduncle ½ an inch long to a 6-8 branched cymose panicle 2 inches long, common rachis pilose or glabrous, bracts at the ramifications small acute deciduous pilose or glabrous, flowers fragrant generally quite sessile at the apex of the branchlets or very shortly pedicellate, calyx densely hairy or quite glabrous, petals pure white long linear induplicato-valvate so as to appear channelled and glabrous or subglabrous, united in pairs by the stamens, ovules attached to the centre of the axis, fruit ovate to obovate oblong apiculate, angled, 6-8 lines long. *Wall. in DC. Prod.* viii. 297;—*Wight Icones tab.* 1246.

Very common in our Western ghat forests from Canara down to S. Tinnevelly, also in Ceylon and Bombay.

Analysis, See Pl. ccxxxix.

1. A full flower.
2. The pair of petals joined by the anthers.
3. A single petal, margin inflexed.
4. Calyx, ovary and stigma.
5. Ovary cut vertically, ovules attached to centre of axis (they are sometimes suberect from a little below the centre.)
6. An anther.

A very variable plant both as to foliage and inflorescence. I have no hesitation about referring C. albidiflora Thw., to this species, as some of my S. Tinnevelly specimens have a long tapering acumen to the leaves and glabrous peduncles and calyx, and the flowers with pedicels. I have a large suite of specimens collected from S. Canara and Coorg down to S. Tinnevelly, and though the leaves and inflorescence look very different in some individuals, there are connecting forms, and they run one into another and could not well be separated, even as varieties; some of my S. Canara specimens have the calyx densely white almost woolly and very coriaceous leaves, the apex quite rounded.

3. CHIONANTHUS LEPROCARPA, *Thw.*—A middling sized tree, leaves subcoriaceous glabrous oblong acuminate almost veinless acute at the base, 2½-5½ inches long by 1-1¾ inch broad, petioles 2-3 lines long, cymes axillary racemoid few-flowered much shorter than the leaf very minutely glanduloso-pilose, flowers shortly pedicellate, calyx-lobes broad subtruncate ciliate, petals involute at the margins, fruit ovoid slightly leprous 1 inch long by 6-7 lines broad, purple, putamen rather woody. *Thw. En. Pl. Zey. p.* 189.

Ceylon, Central Provinces 3000-4000 feet elevation, rather rare.

4. CHIONANTHUS ROSTRATA, *Thw.*—A small tree, leaves subcoriaceous glabrous oblong with a long rostrate acumination, acute at the base, 2½-4 inches long by ¾-1¼ broad, petiole 3-3½ lines long, cymes axillary racemoid short few-flowered very minutely pilose, flowers short pedicelled, calyx-lobes rounded ciliate, fruit glabrous subfusiform 14 lines long 6 lines wide, putamen slightly woody. *Thw. En. Pl. Zey. p.* 189.

Ceylon, Hinidoon Corle.

5. CHIONANTHUS ZEYLANICA, *Linn.*—A shrub or small tree, bark dark ash-colored with many elevated lighter colored specks, branches dichotomous very numerous, leaves short-petioled broad cuneiform lanceolar entire rather obtuse coriaceous smooth, about 3 inches long by 1 broad; racemes axillary solitary scarcely half the length of the leaves, branches sub-opposite diverging 3 flowered, flowers small white (purple when dry) inodorous, calyx segments ovate obtuse villous, petals 4, united in pairs and induplicato-valvate, filaments short, ovary 4-sided ovate, ovules attached to the centre of the axis, style short, stigma obscurely 2-lobed, fruit oval or obovate size of a black currant succulent purple when ripe, putamen obovate rather thin marked with 4 ribs from the apex to the base and 4 small imperfect ones between. *Linn. Sp. Pl. ed. Willd.* i. 47. C. Zeylanica et dichotoma, *Roxb. Fl. Ind.* i. 107 *and* 108. Linociera purpurea et dichotoma, *DC. Prod.* viii. 297.

Kurnool mountains, and forests of our eastern coast; Ceylon hotter parts of the island (called Gherriatta.)

I
Symplocos diguandra
II
Ophioxylon densiflorum
III
Tabernamontana verticellata
IV
Willughbeia Ceylanica
V
Myxia Ceylanica
VI
Holarrhena antidysenterica

HUNTERIA ZEYLANICA. (Nat. order Apocyneæ.)

HUNTERIA. *Roxb.*—GEN. CHAR. Calyx 5-parted without glands, corol infundibuliform, the jaws naked, lobes 5 convolute, stamens 5 inserted on the tube a little above the middle, anthers ovate acute included twice as long as the filaments; ovaries 2 ovoid each 1-celled with 2-4 ovules, style filiform, stigma ovoid short the apex bicuspidate, berries 2 distinct ovoid subpedicellate, 2-seeded or 1-seeded by abortion, pericarp coriaceous not thick, albumen copious, radicle cylindric superior, cotyledons foliaceous elliptic. Trees or shrubs, leaves opposite or verticelled in threes entire glabrous, cymes paniculate terminal or axillary, flowers small.

HUNTERIA ZEYLANICA. (Retz.) A small tree, leaves opposite lanceolate, or ovato-lanceolate, very glabrous bluntly-acuminate entire transversely venose, about 5 inches long by 1½-2 broad, petioles 3-5 lines long, cymes axillary and terminal 2½-3 inches long, flowers yellow about 9 lines long, carpels oblong 1-1½ inches long rostrato-acuminate stipitate.—Cameraria Zeylanica, *Retz. Obs.* 4. *p.* 24. Hunteria, *Thw. En. Pl. Zey. p.* 191.

This tree has only been detected in Ceylon, (if it is distinct from H. corymbosa, Roxb, to which it is certainly closely allied) ; it is common in the warmer parts of the island, and called by the natives Maddeya ; the timber is very fine and close grained and very similar to Box-wood ; it answers well for engraving.

Analysis.

1. A flower.
2. Corol opened.
3. Calyx, style and stigma,
4. Anthers, front and back view.
5. Ovary rather advanced.
6. The same cut transversely.
6a. The same cut vertically.
7. Fruit.
8. One carpel cut transversely.
9. A seed.
10. Embryo with its superior radicle. (The drawing and analysis were communicated by Dr. Thwaites.)

Govindu del. Ramsey lith.

Hunteria zeylanica (Roxb.)

ASTERIASTIGMA MACROCARPA. (Nat. order Bixineæ.)

ASTERIASTIGMA. *Bedd.*—GEN. CHAR. Calyx 4-parted much imbricate, petals 12 each furnished on the inside with a large scale, stamens numerous (60) in 2 rows inserted on to the torus between the scales and the ovary, anthers oblong opening longitudinally along the outer edge and polleniferous, ovary sessile, placentas 6-7, ovules very numerous, stigmas as many as the placentas large sessile spreading 2-lobed. Berry large globose, pericarp woody, seeds numerous (50), testa crustaceous, albumen fleshy, cotyledons large foliaceous ovate plane, radicle short thick inferior. A tree, subglabrous, leaves penniveined petioled entire, flowers rather fleshy in short fascicles on the older branches.

ASTERIASTIGMA MACROCARPA. (Bedd.) A large tree, young shoots minutely aureo-pubescent, leaves exactly oblong with a short sudden acute point at the apex, quite entire, above glabrous or the costa very minutely pubescent towards the base, beneath glabrous except the costa and primary veins (which are minutely strigose), and furnished with very minute white dots (under the lens) 10-12 inches long by 3½ broad, venation very prominent beneath, the primary veins much raised about 7 on each side alternate, veinlets parallel prominent with the venules prominent and beautifully reticulated, petioles 9-10 lines long pubescent, flowers whitish about 1 inch across in few flowered 1½ inch long fascicles on the older branches, pedicels 4-5 lines long thick, calyx segments roundish minutely puberulous or subglabrous, petals much shorter than the calyx-segments oblong much ciliate round the margin with broad scale-like hairs and each furnished on the inside near the base with a thick fleshy hairy more or less 3-lobed scale about ⅔ as long as the petal, filaments about as long as the petals dilated at the base filiform at the apex (rarely furnished with 2 anthers), ovules hairy, seed glabrous more or less angled (from pressure.)

I discovered this very fine tree last September (in young fruit) on the ghat (2500 feet elevation) leading up to Peermede (Travancore hills) from Cottyam, it flowers in March, and I received good specimens of the flowers in spirits, and ripe fruit, from which the drawing is taken. All the flowers sent were bisexual, the anthers being apparently polleniferous, but it is very possible that there may be male flowers in addition, and that the tree may be polygamo-diœcious or monœcious. The fruit and leaves (except that the latter are entire) are exactly those of Hydnocarpus, but I think it differs too much to authorize its being referred to that genus; it may however be co-generic with the little known Taraktogenos of Hasck. There was quite a clump of the trees at the place above mentioned.

Analysis.

1. A fascicle of flowers.
2. A bud.
3. A flower half open.
4. A flower fully open, calyx 4-leaved, petals 12 each with a scale, stamens 60 in 2 regular rows inserted on the torus, ovary with 6-7 large sessile spreading stigmas.
5. A petal shewing the margin ciliate with scales and the thick generally 3-lobed scale attached a little above its base.
6. A flower with most of the petals and stamens removed, to show the torus on which the stamens and petals are inserted.
7. The scale removed from the petal.
8. Shows the regular 2 rows in which the stamens are inserted, the scale has been removed from the petal in the back ground.
9. Anthers, front and back view.
10. A filament with 2 anthers (a few of these occurred in most flowers examined.)
11. Ovary cut vertically.
12. Ovary cut transversely shewing 6 parietal placentas, (this is the usual number, but when there are 7 styles there are 7 placentas) and numerous ovules.
13. An ovule shewing that it is hairy.
14. A fruit (life size) cut open to shew the numerous closely packed seeds.
15. A seed.
16. Vertical section of a seed, the testa removed, shewing the large embryo as it lies in the albumen.

Scamilo del. Dewyndy lith.

Asteriastigma macrocarpa Miers.

MYRISTICA LAURIFOLIA. (Nat. order Myristiceæ.)

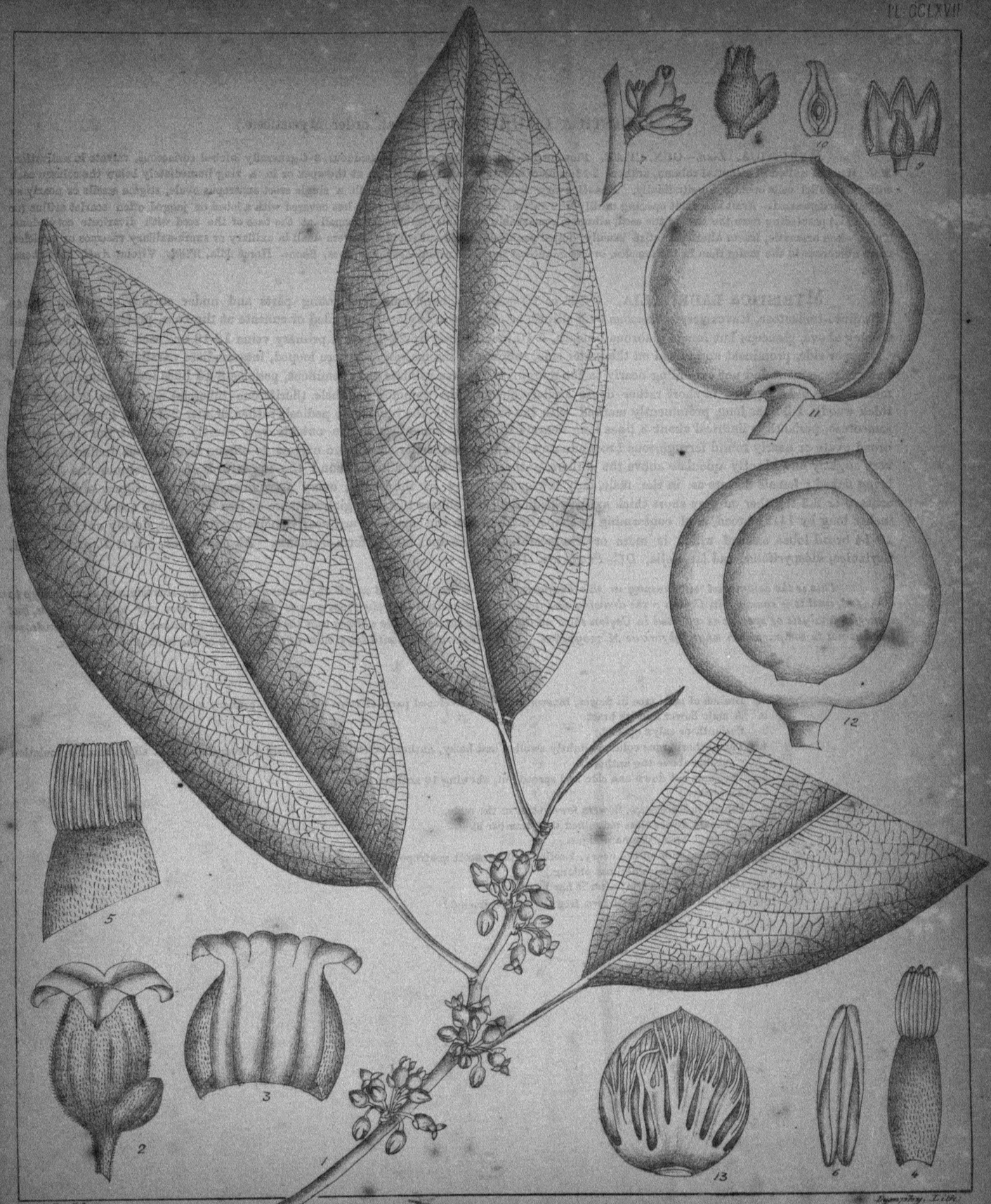
MYRISTICA. *Linn.*—GEN. CHAR. Flowers diœcious, regular, perianth deciduous, 2-4-generally 3-lobed coriaceous, valvate in æstivation. *Male*, stamens united in a central column, anthers 3-18 or more adnate to a central column at the apex or in a ring immediately below the column each with 2 parallel cells opening longitudinally. *Female*, ovary free within the perianth with a single erect anatropus ovule, stigma sessile or nearly so capitate or depressed. Fruit succulent opening tardily in 2 valves, seed erect sessile more or less covered with a lobed or jagged often scarlet arillus (or arillodium) proceeding from the base of the seed, albumen remarkably ruminate, embryo very small at the base of the seed with divaricate cotyledons. Trees, often aromatic, leaves alternate entire usually dotted penniveined without stipules, flowers small in axillary or supra-axillary racemes or panicles, more numerous in the males than in the females, bracts minute or none.—Knema, *Lour.* Pyrrhosa, *Blume.* Horsfieldia, *Willd.* Virola, *Aubl.* Sebophora, *Neck.*

MYRISTICA LAURIFOLIA. (H. F. et T.) A large handsome tree, young parts and under surface of young leaves ferrugineo-tomentose, leaves very coriaceous oval-elliptic or oblong scarcely acute, rounded or cuneate at the base, perfectly glabrous and shining above, glaucous but in age glabrous beneath, 5-10 inches long by 2¼-4 broad, primary veins 12-18 on each side impressed on the upper side, prominent and raised on the under side, running to the margin and there looped, intermediate parallel veins conspicuous but not prominent and not extending nearly to the margin, transverse veinlets not prominent, petioles 8-15 lines long channelled above, male flowers 6-15 together in short rather dense axillary clusters, the common peduncle (floriferous tubercle) sometimes 2 cleft very thick woody, 1-3 lines long, prominently marked with the cicatrices of the bracts, the pedicels rather slender 2-3 lines long ferrugineo-tomentose, perianth cylindrical about 3 lines long densely ferrugineo-tomentose on the outside very shortly 3-cleft at the apex with a broad ovate or nearly round ferrugineous bract adnate to its base, antheriferous column narrow to oblong ferrugineous included, not or very slightly and bluntly apiculate above the anthers, anthers 7-12 linear adnate round the upper 3rd of the column the lower ⅔ being naked; female flowers as in the male, only few generally 3-4 in the heads; ovary ferrugineo-tomentose, stigma oblique, fruit solitary or 2-3 together on very short thick axillary pedicels, from oblong to nearly globose more or less ferruginous according to age, 2½ inches long by 1½-2½ broad, seed conforming in shape to the fruit, the mace or aril nearly encircling the fruit, deeply cut down into 10-14 broad lobes, each of which is more or less lacerated at the apex into filiform segments. *Fl. Ind. Hook. fil. et T. p.* 163. M. Ceylanica, diospyrifolia, and laurifolia, *DC. Prod.* xiv. 190-191.

This is the commonest wild nutmeg in this Presidency, and it is to be found in all our western forests from scarcely any elevation up to 5000 feet, and it is common in Ceylon; the drawing and description are taken entirely from a suite of specimens from our western forests, but a careful analysis of specimens collected in Ceylon show no difference whatever. The nutmeg and the mace are of no value. It is a very handsome tree but not to compare with what I figure as M. magnifica. I am not acquainted with the timber of this or any of the species of Myristica.

Analysis.

1. Branch of male tree in flower, intermediate less developed parallel veins between the primary veins.
2. A male flower and its bract.
3. Perianth or calyx opened.
4. The antheriferous column slightly swollen and hairy, anthers extending down only ⅓ from the apex, a slight blunt apiculation visible above the anthers.
5. The same cut down one side and spread out, shewing 10 anthers present.
6. An anther.
7. Female inflorescence, flowers fewer than in the male.
8. A female flower (less magnified than number 2).
9. The same open, stigma oblique.
10. Vertical section of the ovary, 1-celled with an erect anatropous ovule.
11. Ripe fruit (it is sometimes oblong.)
12. One valve of the fruit after it has burst.
13. Seed and its aril (All drawn from living specimens).



Myristica laurifolia (H.f. & T.)

MYRISTICA MAGNIFICA. (Nat. order Myristiceæ.)

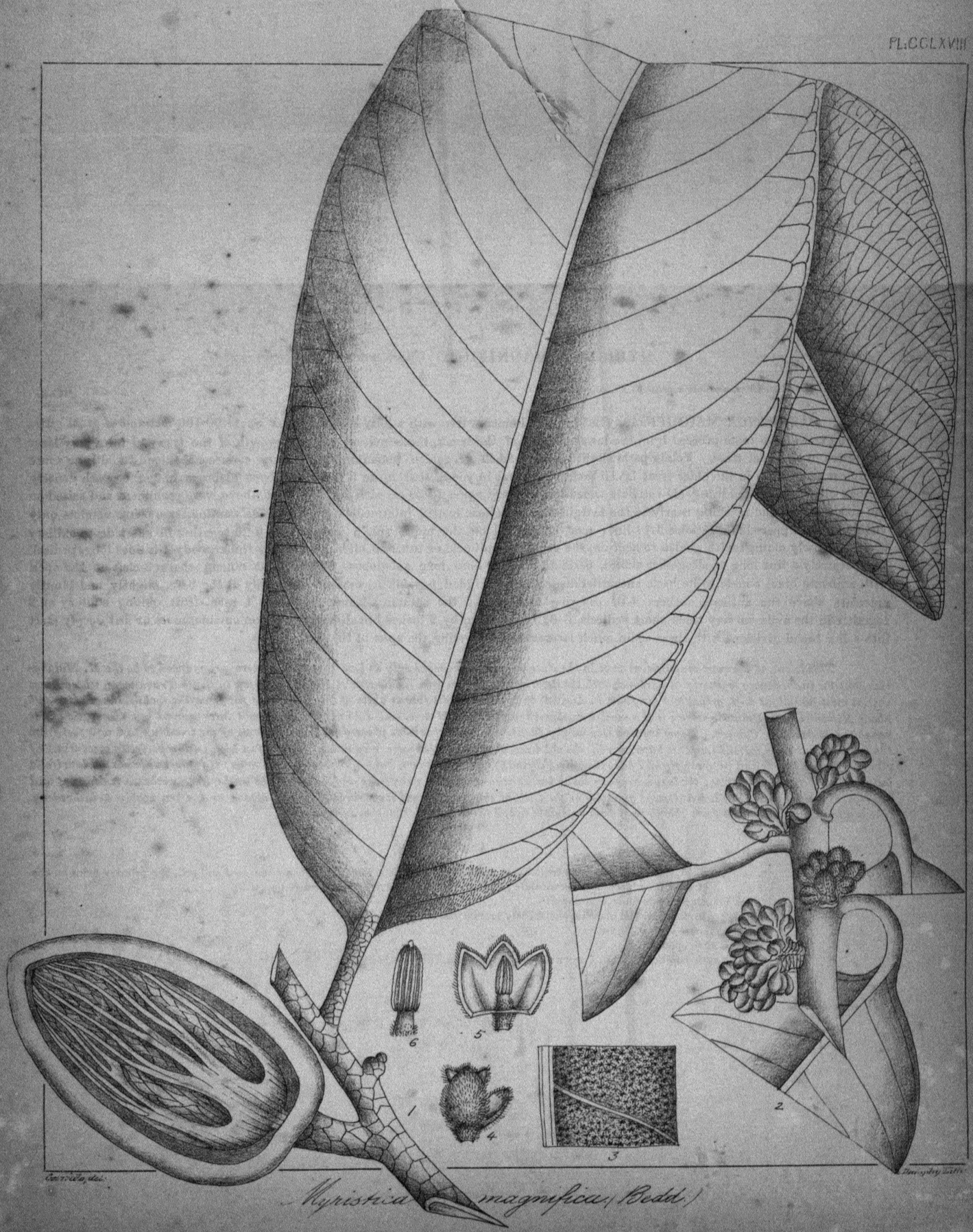
For Gen. Char. see-letter press to Pl. cclxvii.

MYRISTICA MAGNIFICA. (Bedd.) An immense tree with a lofty straight trunk up to 90-100 feet and of great girth, in young trees large roots proceed from the lower 6-8 feet of the trunk, these increase with the growth of the tree and form very large buttresses in the older trees. Young parts clothed with reddish or golden tomentum, leaves very corlaceous oblong to elliptic acute or almost acuminate, in the older trees 10-15 inches long, but in young trees up to 2 feet long, above glabrous in age, beneath densely clothed with close set reddish-golden stellate tomentum, primary veins 20-26 on each side impressed above, very prominent and raised on the under surface and reaching nearly to the margin where they are looped, intermediate parallel veins wanting, transverse veinlets only visible on the upper side: petioles 3-14 lines long channelled on the upper side; male flowers 8-20 together in short dense axillary clusters densely clothed with golden tomentum, the common peduncle or tubercle often 2-cleft very thick woody 1-8 lines long, pedicels thick scarcely a line long or altogether absent, perianth about 2 lines long subglobose or somewhat oblong short 3-cleft at the apex with an ovate bract adnate to its base, antheriferous column included not much swollen, hairy only at the base, slightly and bluntly apiculate above the anthers, anthers 8-10 covering nearly $\frac{3}{4}$ of the column; female flowers not seen, fruit oblong solitary or 2 together in the axils on very thick short pedicels, 3-3$\frac{3}{4}$ inches long by 2 inches broad, hoary on the outside, mace or aril deeply cleft into a few broad divisions with these again much lacerated and covering the apex of the seed.

This is one of the most magnificent trees in the Presidency. Specimens only in leaf sent to Kew were pronounced to be the M. Malabarica, but the inflorescence is utterly at variance with the descriptions of that tree. This species I have only seen in South Travancore, where I met with it most abundant and gregarious (in fruit in August) in the dense moist forests quite in the plains not far from the foot of the ghats round about Mimootee near Colatoorpalay; it is a most conspicuous and beautiful tree, and I do not think it could have escaped my observation if it inhabited Malabar or Canara. Every sapling was amply furnished with large roots proceeding from the base of the trunk up to 6 or 8 feet from the ground, and these formed immense buttresses in the old trees, many of which were very much over 100 feet high with a perfectly erect trunk of 80 or 90 feet in length and of great girth. I have since (in February) received flowers, but unfortunately only male: it is most allied to M. laurifolia but a very different looking tree; the leaves are very much larger with a different pubescence and venation, the antheriferous column is different and the fruit is much larger. I collected a great quantity of the fruit of this species, and they were all exactly oblong and often nearly 4 inches long. The fruit of laurifolia varies from oblong to globose and does not, I think, exceed 2$\frac{1}{2}$ inches in length.

Analysis.

1. A branch of the female tree, the fruit burst and one of the valves removed, to show the seed and aril, the primary veins on the leaf most prominent, no intermediate parallel less developed veins as in laurifolia.
2. A branch of the male tree in flower.
3. Under surface of a leaf shewing the densely matted stellate pubescence.
4. Male flower with its bract.
5. The same open.
6. The antheriferous column, $\frac{3}{4}$ covered with the anthers, the base hairy.



Myristica magnifica, (Bedd.)

MYRISTICA MALABARICA. (Nat. order Myristicæ.)

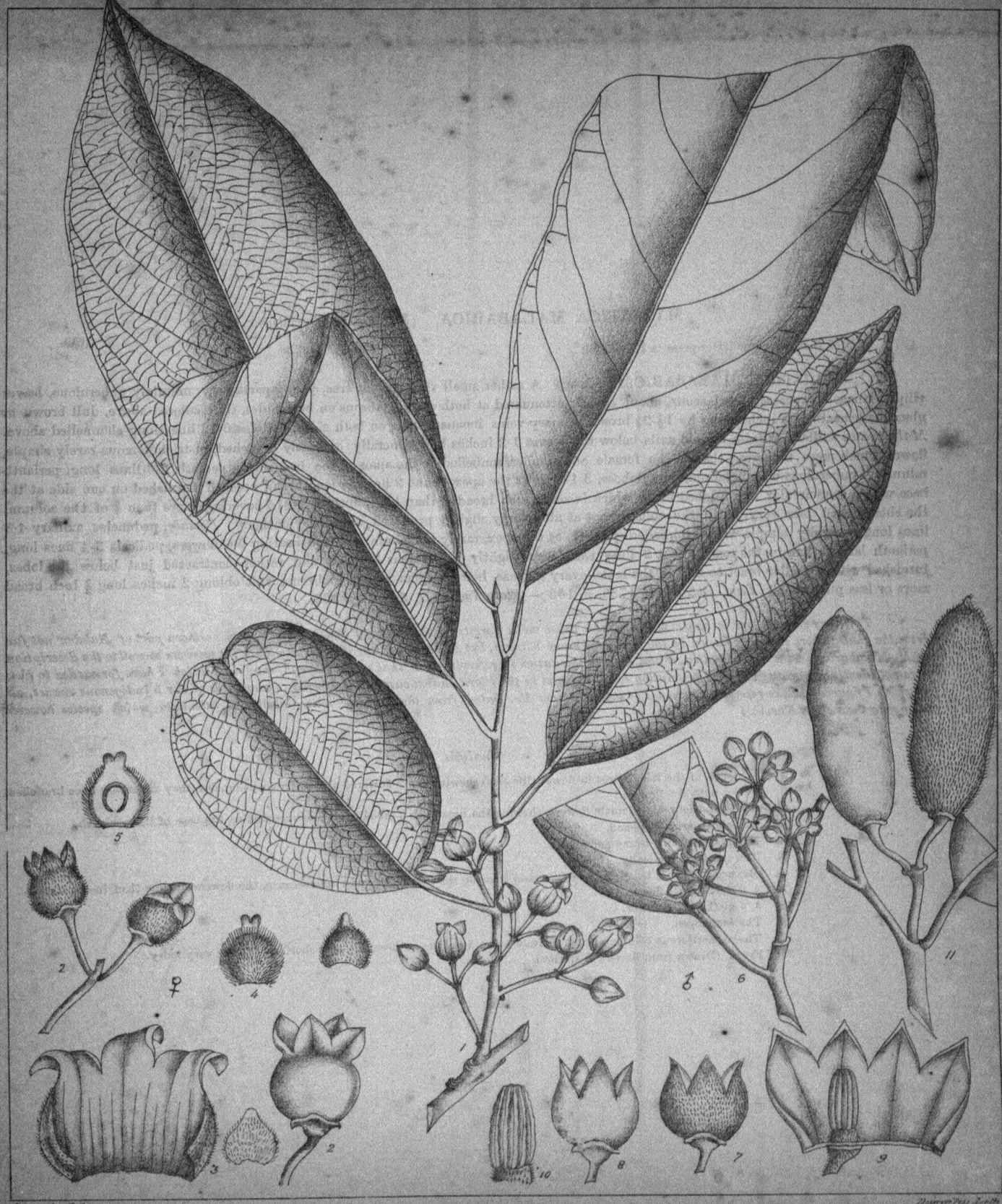
For Gen. Char. see letter-press to Pl. cclxvii.

MYRISTICA MALABARICA. (Lam.) A rather small very elegant tree, young parts very minutely puberulous, leaves elliptic-lanceolate, scarcely coriaceous, about equally attenuated at both ends, glabrous on both sides, dull colored above, dull brown or glaucous beneath, 4-8 inches long by 1½-2¼ broad, primary veins inconspicuous on both sides, petioles 6-12 lines long channelled above. *Male*, cymes axillary or from the old axils below the leaves 1-2 inches long generally cymosely branched, bi-trichotomous rarely simple, flowers much more numerous than in the female and smaller, umbelled at the apex of the branchlets, pedicels 2-6 lines long, perianth minutely puberulous or subglabrous, subglobose, 3-4-cleft at the apex, about 2 lines in length and breadth furnished on one side at the base with a semicircular sub 3-lobed bract which is very much broader than high, anthers 10-15 covering more than ¾ of the column, the short naked base very hairy, the column not at all or only slightly produced above the anthers. *Female*, peduncles axillary 4-8 lines long generally simple with 3 umbelled pedicels at the apex, rarely once branched and bearing 5-6 flowers, pedicels 3-4 lines long, perianth larger than in the male about 3 lines each way slightly puberulous 3-4 cleft and rather contracted just below the lobes, furnished with a similar bract to that in the male, ovary globose hairy, stigma 2-cleft glabrous, fruit oblong 2 inches long ½ inch broad more or less pubescent. *Lam. Act. Paris.* 1788. *p.* 162 ;—*Flora Indica H. f. et T. p.* 163.

This very elegant tree is very common in the dense moist forests in the plains of South Canara and northern part of Malabar not far from the ghats, where it is well known by the Canarese name Kànagi, but I have not observed it further south ; it answers so well to the description of M. Malabarica in the Flora Indica, that I have no hesitation in referring it to that species, though specimens which I have forwarded to Kew were not identified ; at any rate the description of that species in the Flora Indica cannot be referred to any other of our 5 indigenous species, all of which I figure. I have received specimens of this tree from Mr. Dalzell from the Concan forests (labelled M. attenuata, which species however belongs to the section Knema.)

Analysis.

1. A branch of the female tree in flower (life size) shewing the 3-flowered umbelliferous peduncles (they are rarely once branched with 5-6 flowers.)
2. Three and four-cleft female flowers, shewing the broad sub 3-lobed bract half surrounding the base of the perianth.
3. A 3-cleft perianthopened.
4. The globose hairy ovary and stigma
5. The same cut vertically.
6. Branch of a male tree in flower (life size) shewing the more compound inflorescence, the flowers smaller than in the female.
7. A 3-cleft female flower.
8. A 4-cleft female flower.
9. The same open.
10. The antheriferous column almost entirely covered by the anthers, the very short naked base very hairy.
11. Fruit. (Drawn from flowers in spirits.)


Gowrando del.
Myristica Malabarica (Lam.)

MYRISTICA FARQUHARIANA. (Nat. order Myristiceæ.)

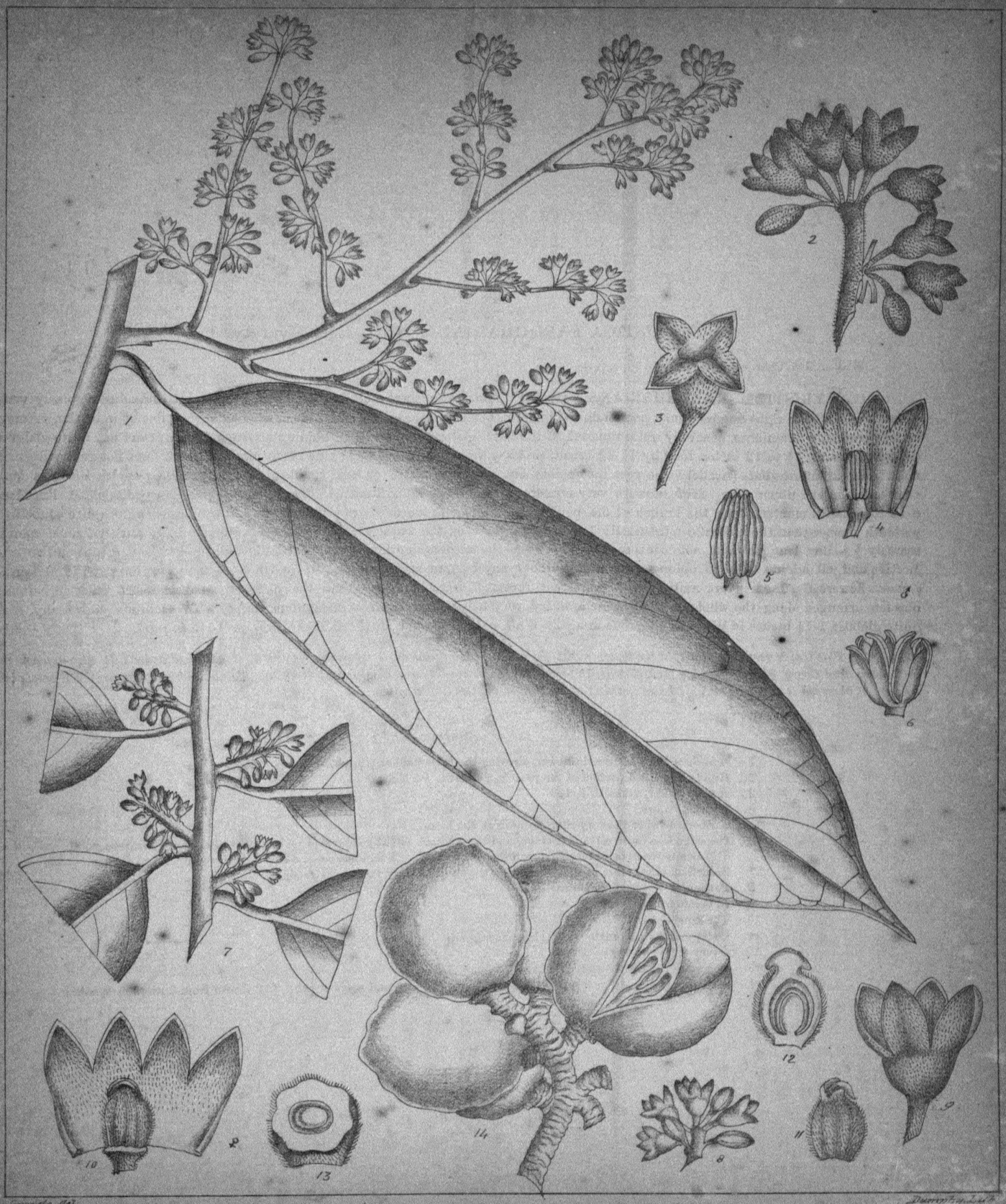
For Gen. Char. see letter-press to Pl. colxvii.

MYRISTICA FARQUHARIANA. (Wall.) A very handsome middling sized tree, trunk erect, branches regularly verticellate and quite at right angles, young parts minutely rufo-pubescent, leaves coriaceous oblong with an abrupt fine acumination or more or less gradually acuminate, generally quite rounded at the base, glabrous and rather shining above, very glaucous but quite glabrous (in age) beneath, 5½ to 12 inches long by 1¾-4¾ broad, primary veins 10-14 on each side inconspicuous above and not sunken, prominent beneath, intermediate parallel veins very incomplete but generally more or less visible on the under side, petioles 4-9 lines long, channelled on the upper side. *Male*, flowers very numerous in axillary much branched rufo-pubescent panicles, pedicels 2-3 lines long 6-10 together in clusters along the branch of the panicle with or without a short peduncle, and in the former case quite umbellate, perianth shorter than the pedicel 3-4 (generally 4) cleft pubescent on the outside and inside on its upper half, antheriferous column scarcely ½ a line long glabrous not continued up between the anthers, anthers 7-11 (generally 7-8) produced back into a flat connective and all adnate into an oblong cone (but without any column between them) not much more than ½ as long as the perianth; *female*, flowers 6-10 on short axillary rufo-pubescent racemes scarcely longer than the petioles, pedicels short thick or almost obsolete arranged along the whole of the peduncle, ovary very hairy, stigma large semilunate deeply bifid glabrous and fleshy, fruit quite globose 1-1¼ inches in diameter glabrous in age. *Wall. cat.* 6798, and *Hook. & T. Fl. Ind. p.* 161. *in part.*

This tree is very abundant in the dense moist forests in the plains of S. Canara, where it is called Pindee; it also ascends the S. Canara and Coorg ghats up to an elevation of 1500 *or* 2000 *feet, and I have also found it on the Tambercherry ghat in the Wynad, but I have not observed it further south. I know nothing of its timber or uses.*

Analysis.

1. Branch of the male tree in flower, showing the loose panicle (life size.)
2. Highly magnified portion of the panicle, perianths 4-3-cleft.
3. A male flower, perianth 4-cleft.
4. The same open.
5. Anthers shewing the very short column at the base.
6. The same in a more advanced stage, and the anthers slightly separated to show that they have incurved points and a thin membranaceous connective down their inner face, and that the column is not produced up between them.
7. Branch of female tree in flower, showing the short axillary racemes (life size.)
8. Portion of a raceme magnified.
9. A 4-cleft female flower.
10. The same open.
11. Ovary and 2 cleft lunate fleshy glabrous stigma.
12. Ovary cut vertically.
13. The same cut transversely.
14. Branch of ripe fruit, one of them burst, showing the seed and mace or aril. (All drawn from flowers in spirits.)



Myristica Farquhariana (Wall.)

MYRISTICA CORTICOSA. (Nat. order Myristiceæ.)

For Gen. Char. see letter-press to Pl. colxvii.

MYRISTICA CORTICOSA. (Lour.) A very large erect handsome tree, young parts more or less downy often with a very dense close set golden tomentum, leaves from membranaceous to coriaceous, glabrous above in age, glabrous and very glaucous beneath or occasionally more or less aureo or rufo-pubescent especially on the costa, narrow-lanceolate to broad-lanceolate or rarely oblong or ovate, acute or with a long tapering point or sometimes obtuse, 4-8 inches long by 1-3 broad, 16-20 primary veins on each side prominent beneath, and somewhat conspicuous above but not impressed, intermediate parallel incomplete veins present or absent, veinlets transversely reticulated conspicuous beneath, petioles 4-6 lines long channelled on the upper side, peduncles in both sexes axillary or from the old axils, 1-4 lines long, 1-6 flowered in the male 1-3 flowered in the female, pedicels 2-4 lines long rather more slender in the male than in the female bracteated above the middle and with the perianth densely aureo or rufo-tomentose, perianth-lobes rather deep, veined, tube larger in the female, 3-4 parted. *Male*, antheriferous column dilated at its apex into a circular 11-13 toothed disk, on each tooth of which an anther is inserted on the underside; *female*, ovary oval hairy, stigma large 2 lobed, lobes somewhat lacerated, fruit oval densely downy about 1½ inch long by ¾ inch broad.—Knema corticosa, *Lour. Fl. Coch.* 742. Myristica globularia, *Lam.* M. glauca, *Bl. Bidj.* 576;—*Rumph.* 1. 182 *t.* 60. M. lanceolaria, *Wall. cat.* 6742. M. missionis, *Wall. cat.* 6788. M. angustifolia, *Roxb. Fl. Ind.* iii. 847.

A lofty very handsome tree, common in all our western moist forests up to 3000 feet elevation, from South Canara down to South Trvancore, very abundant about the foot of the Nilgiris west side (near Nellicootah), and about the Tinnevelly ghats. Some of my S. Canara specimens have the leaves quite ovate 5 inches long by 3 broad, but other forms run gradually into the narrow lanceolate shape which is most common; the tree is also found in Birmah, from which country I have specimens quite corresponding to our Indian ones, and it inhabits the east part of Bengal, the Malay Peninsula, Java, Borneo and Cochin China.

Analysis.

1. A branch of male tree in flower (sometimes the leaves are very much broader and in rare cases they are ovate.)
2. A 3-cleft male flower with an 11-cleft antheriferous disk, lobes of the perianth with nerves, densely stellato-pubescent on the outside.
3. A 4-cleft male flower antheriferous disk 13-lobed.
4. Underneath view of the antheriferous-disk and its column showing that the anthers are placed, underneath the teeth of the disk dehiscing downwards.
5. Anthers, upper and underneath view, the tooth of the disk being the connective.
6. A male flower bud.
7. A 4-cleft male perianth cut open, shewing its tube shorter than in the female.
8. Branch of female tree in flower.
9. A 3-cleft female flower tube longer than in the male.
10. The same cut open, hairy ovary and bifid somewhat lacerated stigma.
11. Ovary cut vertically.
12. Fruit.
13. The same burst, showing the seed and its aril. (Drawn from living specimens.)

Myristica corticosa. Lour.

CLEIDION JAVANICUM. (Nat. order Euphorbiaceæ.)

CLEIDION. *Blume.*—GEN. CHAR. Diœcious. Calyx 3-5 parted ; in the male valvate, in the female imbricate, petals none, disk none or sometimes present in the female. *Male*, stamens indefinite inserted on to a conical receptacle arranged in many verticels, filaments free attached to the centre of the anthers, connective often produced beyond the cells, anther cells dehiscing transversely, rudiment of ovary none ; *female*, ovary 2-3-celled, cells 1-ovuled, ovules pendulous, styles 2-3 each with 2 long filiform papillose stigmas. Capsule 2-3-coccous, seeds exarillate globose ; cotylodons much longer than the radicle, cordate at the base. Trees or shrubs, leaves alternate, toothed penninerved, stipules soon caducous, male flowers axillary glomerate in interrupted spikes or racemose or panicled, female flowers axillary, solitary or loosely racemose. *Bl. Bijdr. p.* 612 ;—*DC. Prod.* xv. *p.* 983. Redia, *Casaretto*, Psilostachys, *Turcz.* Lasiostyles, *Presl.* Tetraglossa, *Bedd. in Mad. Lit. Journ.*

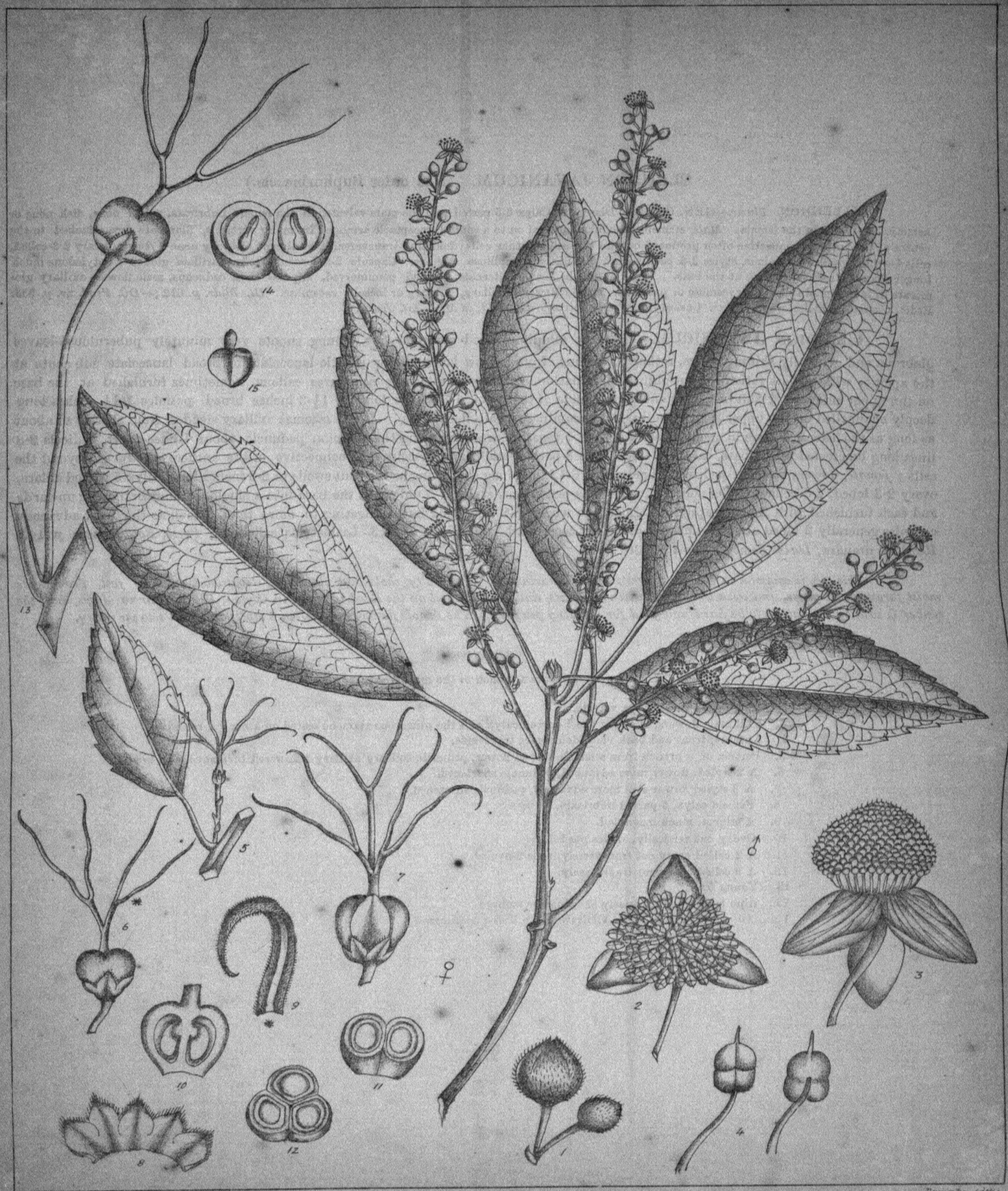
CLEIDION JAVANICUM. (Bl.) A middling sized glabrous tree, young shoots very minutely puberulous, leaves glabrous and generally shining above, rather coriaceous, from narrow lanceolate or elliptic-lanceolate to broad lanceolate, sub acute at the apex or with a short rather abrupt obtuse acumination, distantly serrated the serratures callous, sometimes furnished at the base on the upper side with 2 hollow glands one on each side of the costa, 4-7 inches long by 1½-3 inches broad, petioles 1-1½ inches long deeply channelled on the upper side, stipules ovate acuminate small deciduous. *Male*, racemes axillary slender from shorter to about as long as the leaves, flowers in small clusters of 3 to 8 together arranged along the common peduncle about 4 lines apart, pedicels 2-3 lines long bracteoled at the base, calyx 1½ lines long 3-parted slightly pubescent, the connective of the anthers produced beyond the cells ; *female*, flowers solitary, peduncles bracteated, 6-12 lines long elongating as the fruit swells to 2-3 inches long, calyx 5 parted ciliate, ovary 2-3 lobed, 2-3 celled, ovules solitary in the cells pendulous, styles 2-3 united at the base into a single column branching upwards and each furnished with 2 long papillose stigmas, the whole 6-8 lines long but elongating to more than 1 inch as the fruit advances, capsules generally 2 lobed about 8 lines in diameter, cocci hard. *Bl. Bidj. p.* 613. Lasiostyles salicifolia, *Presl. Bot. Bemerk. p.* 149. Rottlera urandra, *Dalz. Bombay Flora p.* 230.

This tree is common in the moist forests on the Anamallays (Anagoody shola and elsewhere) elevation 2000-3000 *feet, Travancore moist forests below ghats, and elsewhere in our western forests, and is also found on the Bombay ghats, in Ceylon, Bengal, Birma, Java, &c. ; the timber is said by the natives to be hard and good for building purposes. The female flowers have often* 3 *styles and* 3 *cells to the ovary.*

Analysis.

The Figure represents a branch of the male tree in flower.

1. Male flower buds, calyx valvate.
2, 3. Full male flowers, showing the 3-parted calyx and the numerous stamens seated on a conical receptacle.
4. Anthers, front and back view, dehiscence transverse.
5. Portion of a branch from a female tree in flower, peduncle solitary axillary 1-flowered furnished with bracts.
6. A 2-styled flower more advanced, peduncle shortened.
7. A 3-styled flower still more advanced, peduncle shortened.
8. Female calyx, 5-parted imbricate.
9. A stigma, much magnified.
10. Ovary cut vertically, ovules pendulous.
11. A 2-celled ovary cut transversely, cells 2-ovuled.
12. A 3-celled ovary cut transversely.
13. Young fruit.
14. Ripe fruit cut transversely showing the embryo.
15. An embryo removed. (All drawn from living specimens.)



Cleidion Javanicum (Bl.)

TRIGONOSTEMON LAWIANUS. (Nat. order Euphorbiaceæ.)

TRIGONOSTEMON. *Blume.*—GEN. CHAR.: Monœcious, calyx of both sexes imbricate, in the female sometimes increasing in size with the fruit, petals alternate with the calyx-segments generally present in both sexes or rarely wanting in the female; disk present or rarely wanting. *Male*, stamens various in number in 1-3 verticels on a central receptacle which is not raised, anthers 2 celled dehiscing longitudinally extrorse or introrse, rudiment of ovary none. *Female*, ovary 3-celled, cells 1 ovuled, styles 3 connate at the base various in length, bifid or rarely twice bifid. Fruit capsular with 3 cocci, seed exarillate. Trees or shrubs, leaves alternate bistipulate penninerved lanceolate serrulate or entire, inflorescence axillary. *Bl. Bijd.* 600;—*DC. Prod.* xv. 1105. Silvœa, *Hook. et Arn.* Dimorphocalyx, *Thw.* Tritaxis, *Baill.* Telogyne, *Baill.* Athroisma, *Griff.* Cluytiæ, Sp., *Roxb.* Agynoiæ, Sp., *Wall.* Crotonis, Sp., *Wall and Nimmo.*

Section I, DIMORPHOCALYX, *Thw.*—*Male calyx shortly* 5 *toothed, female* 5-*parted increasing in fruit, petals and disk present in male and female; stamens about* 10 14 *in* 2-3 *verticels, anthers introrse, filaments more or less connate.*

TRIGONOSTEMON LAWIANUS. (Nimmo.) A small or middling sized much branched glabrous tree, (sometimes only a shrub,) leaves submembranaceous, lanceolate or ovate, sparingly glanduloso-punctate at the margins, or inconspicuously crenated or quite entire, 1-6 inches long by 1½-2¼ broad, petioles 4-12 lines long, stipules triangular from a broad base rather persistent, cymes few flowered terminal and axillary sessile or shortly pedunculate or rarely slender and lax, pedicels 1-6 lines long, flowers generally all of one sex, bracts small. *Male*, calyx cupuliform shortly 5-toothed or undulated, petals 5 erect reflexed at the apex white in color, disk dilated into 5 glands alternate with the petals, stamens 10-14 in 2 or 3 series, filaments more or less connate free upwards. *Female*, calyx large submembranaceous deeply 5-parted increasing with the fruit, petals as in the male, disk annular and less developed, ovary hairy, styles 3, stigmas bifid reflexed, capsule about 5 lines in diameter.—Croton Lawianus, *Nimmo in App. to Graham's Bot. of Bombay.* Dimorphocalyx glabellus, *Thw. and Bedd. Linn. Trans. vol.* xxv. *tab.* 26.

A very common tree in our dense moist western forests from Canara down to S. Travancore, up to 3500 *feet elevation on the Bombay ghats and in Ceylon. I know nothing of its timber; it is generally a middling sized tree, but sometimes flowering only as a shrub; in Ceylon it is called Welle wenne.*

Analysis.

1. A branch with female flowers.
2. A female flower.
3. A petal.
4. Ovary, styles and annular disk.
5. Ovary cut vertically, ovules attached to centre of axis.
6. Ovary cut transversely 3 cells, each 1 ovuled.
7, 8. Young fruit, calyx increasing in size.
9. A branch with male flowers.
10. A male flower.
11. Petals.
12. A male flower petals removed, showing calyx, 5-lobed disk and stamens sub 3-verticelled, the filaments connate below free above.
13. A stamen, anthers introrse.
14, 15. An abnormal male flower and its stamens.

W. Fitch lith.

Dormyhy del.

Trigonostemon Lanrianus (Nimmo)

OSTODES ZEYLANICA. (Nat. order Euphorbiaceæ.)

OSTODES. *Blume.*—GEN. CHAR. Diœcious, calyx of the male and female much imbricate, segments 5-6; petals present in both sexes imbricate alternate with the calycine segments and with the glands or lobes of the disk. *Male*, stamens more or less numerous central on a convex receptacle, filaments sub-connate, anthers 2 celled dehiscing longitudinally introrse or extrorse, no rudiment of an ovary. *Female*, ovary 3 celled, cells 1 ovuled, styles 3 very short, stigmas bifid or simple, fruit a woody capsule with 2-3 cocci, seed exarillate. Trees, leaves alternate with stipules, penniveined denticulate or entire coriaceous, flowers panicled or rarely fasciculate in the axils. *Bl. Bidj. p.* 619. Desmostemon, *Thw. En. Pl. Zey. p.* 278.

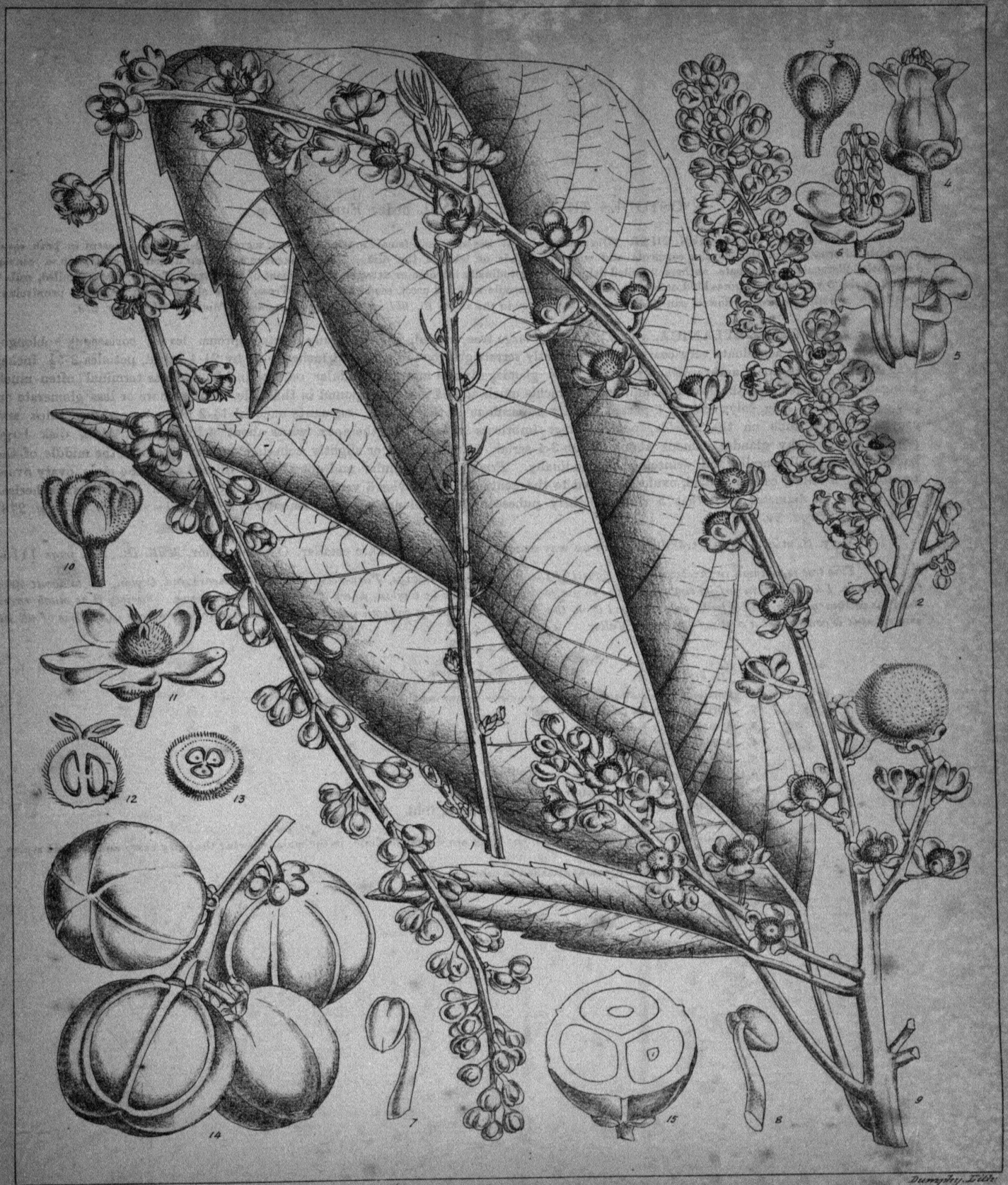
OSTODES ZEYLANICA. (Thw.) A very large tree, ramuli angled, young parts leprous, leaves coriaceous oblongo-lanceolate acute or acuminate very coarsely and distantly serrate glabrous in age, 8-18 inches long by 2½-4 broad, petioles 2-3½ inches long tumid at the apex and furnished with 2 minute glands, stipules minute glandular on the inside, panicles terminal often much elongate and longer than the leaves pendulous, the rachis much angled more compound in the male, flowers more or less glomerate on pedicels 2-3 lines long, calyx deeply 5-parted slightly puberulous on the outside, segments unequal 1½-2 lines long obtuse thick and generally with a knob on the outside, petals 5 erect imbricate reflexed at the apex white about 4 lines long. *Male*, disk large dilated into 5 fleshy glands, stamens about 15 sub-3-4-serial, filaments free or slightly cohering, anthers fixed by the middle of the back extrorse, cells parallel and dehiscing longitudinally. *Female*, disk annular and not as much dilated as in the male, ovary ovoid tomentose, 3-celled, cells 1 ovuled, ovules attached to the centre of axis, styles 3 very short, stigmas bifid small, capsule subspherical 1-1½ inches in diameter somewhat 5 ribbed slightly pubescent, seed oblong.—Desmostemon Zeylanicus, *Thw. En. Pl. Zey. p.* 278. Ostodes, *DC. Prod.* xv. *p.* 1114.

Vary. *β. minor*, a small tree differing in no way except that all its parts are smaller. Ostodes minor, *Mull. DC. l. c. page* 1115.

This tree is common in the dense moist forests of the Wynad, Anamallays, Tinnevelly ghats, Travancore and Ceylon, up to about 4000 *feet elevation. I know nothing of its timber but it is in use for ordinary work in Ceylon, where it is called Walkakoona. Variety β is much rarer than the ordinary form, and I have only observed it on the Anamallays, and it occurs in Ceylon, it differs in no way except in the size of all its parts, but it is considered a distinct species by Muller.*

Analysis.

1. Portion of a male panicle in very young bud shewing the much angled rachis.
2. Portion of a male panicle in flower.
3. A male flower bud.
4. A male flower.
5. The petals.
6. Calyx stamens and disk.
7,8. Anthers, front and back view.
9. Branch of the female tree in leaf, flower and young fruit.
10. Female flower bud.
11. Female flower open petals removed (the latter are similar to those in the male) shewing the hairy ovary and 3 short styles with their bifid stigmas.
12. Ovary cut vertically, ovules attached to centre of axis.
13. Ovary cut transversely 3-celled, cells 1-ovuled.
14. Ripe capsules.
15. A capsule cut transversely.



W. Fitch, del.

Dumphry, Delin.

Ostodes Zeylanica. (Thw.)

PUTRANJIVA ROXBURGHII. (Nat. order Euphorbiaceæ.)

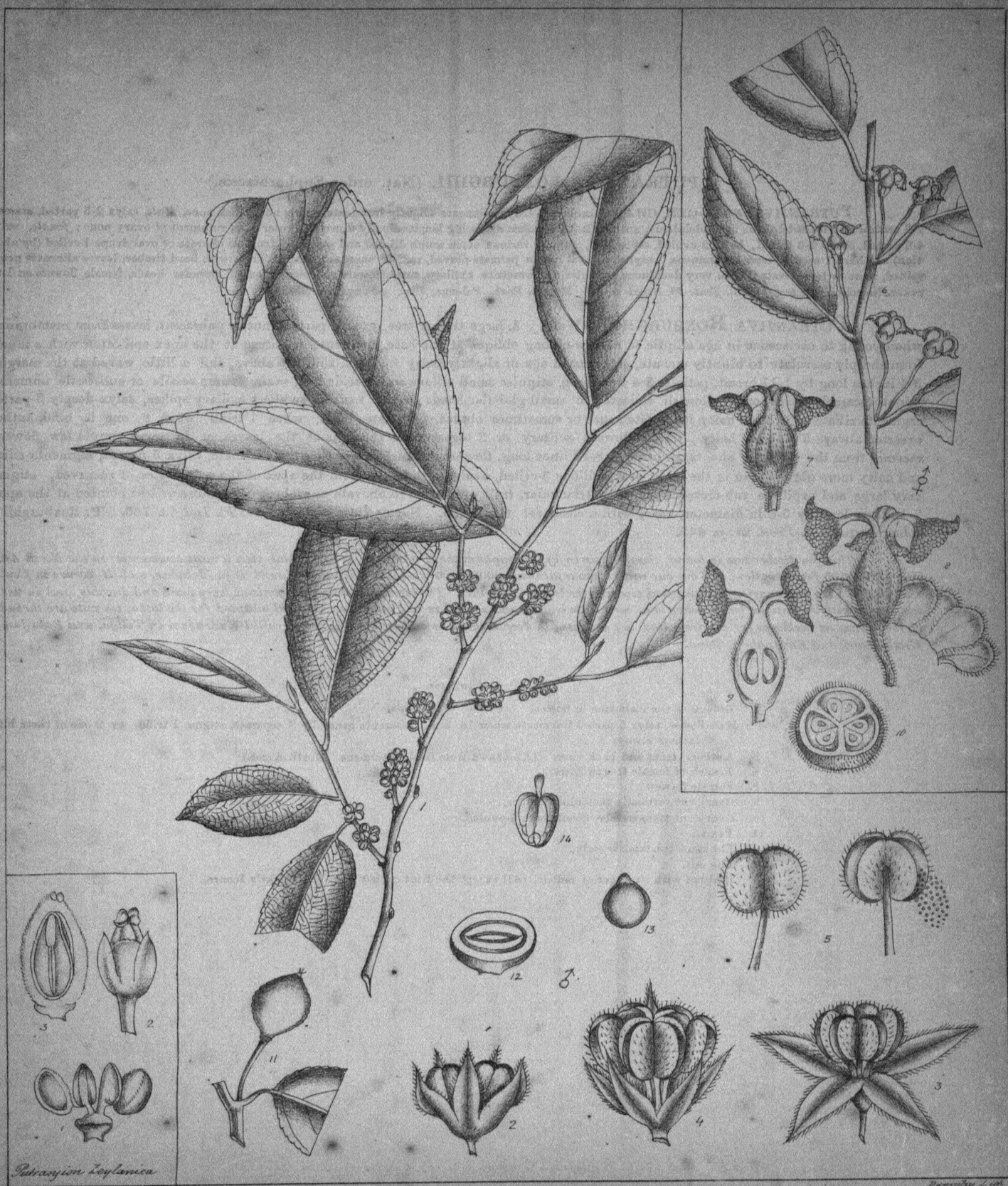
PUTRANJIVA, *Wall.*—GEN. CHAR. Diœcious. Calyx segments slightly imbricate, petals none, disk none. *Male*, calyx 2-5 parted, stamens 2-3 central free monadelphous or diadelphous, anthers 2-3 subglobse dehiscing longitudinally down the outer rim, rudiment of ovary none; *female*, calyx 4-6 parted, ovary 2-3 celled, cells 2-ovuled, styles 2-3, stigmas various often much dilated and papillose, fruit an obovate or oval drupe 1-celled (by abortion) nut hard 1 seeded, seed albuminous, cotyledons oval plane palmate-nerved, radicle short superior. Trees with hard timber, leaves alternate penni-veined, more or less serrated, with very deciduous stipules, inflorescence axillary, male flowers collected in small globular heads, female flowers on long peduncles solitary or few. *Wall. Tent. Fl. Nepal. p.* 61. Nageia, *Roxb.* Palenga, *Thw.* Pongalam, *Rheede.*

PUTRANJIVA ROXBURGHII. (Wall.) A large timber tree, young parts minutely pubescent, leaves from membranous when young to coriaceous in age elliptic to narrow-oblong oblique at the base, sub-acute or obtuse at the apex and often with a mucro, from sharply serrulate to bluntly crenate, glabrous in age or slightly hairy beneath, shining above, and a little waved at the margins, 3-4 inches long by 1-1½ broad, petioles 3-4 lines long, stipules small villous soon deciduous; *male*, flowers sessile or subsessile numerous minute (scarcely a line long) yellowish collected in small globular heads in the axils or on short axillary spikes, calyx deeply 5-parted, segments ciliate and often hairy lanceolate acute or sometimes obtuse, filaments 1-2-3, when 1 trifid, when 2 one is bifid, anthers exserted always 3 globose hairy; *female*, flowers solitary or 2 together in the axils of the leaves, or in small simple few flowered racemes from the year old shoots, peduncles 8-12 lines long, flowers greenish larger than in the male, calyx 5-parted, segments ciliate and hairy more obtuse than in the male, ovary villous 3-celled, ovules pendulous from the apex of the axis, styles 3 recurved, stigmas very large and papillose sub-crescent-shaped or triangular, fruit oval ovoid to obovate or globose often more or less pointed at the apex, 7-10 lines long by 5·8 in diameter, hoary with a close set tomentum. Nageia Putranjiva, *Roxb. Fl. Ind.* iii. 766. P. Roxburghii et sphærocarpa, *DC. Prod.* xv. *p.* 443.

This fine timber tree is found, though sparingly, throughout the Presidency, where I have seen it most common is on the North Arcot hills 1000-1500 *feet elevation, and on our eastern mountains at* 2000-3000 *feet, but I have also found it in Malabar, and it occurs in Ceylon and Bengal; the fruit varies in shape and size and the leaves in texture. The timber is white close-grained, very hard and durable, and in use in some parts with the natives, but appears to be very little known, and should receive attention; it is well adapted for the lathe; the nuts are threaded by the natives as necklaces for children, and are supposed to keep them in good health. The tree is called Kudrajuvi in Teligu, and Puta-jan in Hindoostani, and Karupale in Tamil.*

Analysis.

1. Branch of the male tree in flower.
2, 3, 4. Male flower, calyx 5 parted imbricate when in bud, filaments generally 3 separate, stigma 1 trifid, or 2 one of them bifid, anthers always 3.
5. Anthers, front and back view. (All drawn from fresh specimens. North Arcot.)
6. Branch of female tree in flower.
7, 8. Female flowers.
9. Ovary cut vertically pendulous ovules.
10. Ovary cut transversely, 3 cells each 2-ovuled.
11. Fruit.
12. The same cut transversely.
13. The nut.
14. Embryo with its superior radicle. (All except the fruit copied from Dr. Wight's Icones.


Putranjiva Roxburghii (Wall.)
Putranjiva Zeylanica
Covernde del.
Dampsey Lith.

ALEURITES MOLUCCANA. (Nat. order Euphorbiaceæ.)

ALEURITES. *Forst.*—GEN. CHAR. Monœcious. Calyx of both male and female flowers splitting rather irregularly into 2-3 valvate segments, petals both male and female 5 contorted in æstivation. *Male*, stamens 7-22 inserted in 2-4 verticels on an erect naked column, anthers introrse or rarely extrorse dehiscing longitudinally, disk urceolate, its 5 glandular lobes alternate with the petals, or with 10 lobes, rudiment of ovary none. *Female*, disk of 5 glands free, alternate with the petals, ovary 2-5 celled, cells 1-ovuled, ovules pendulous, styles as many as the cells of the ovary bifid to almost the base, fruit a large fleshy drupe with 1-2 hard bony nuts, albumen oleaginous, embryo straight the cotyledons orbicular-ovate palminerved membranaceous, radicle very short. Trees, often with stellate pubescence, leaves alternate long petioled cordate or lobed entire or serrate often biglandulose at the base, flowers in terminal panicles. *Forst. Char. Gen. n.* 56 *c. ic.* 1,776. Camirium, *Rumph.* Dryandra, *Thunb.* Vermicia, *Lour.* Telopea, *Soland.* Ambinux, *Commerson.*

ALEURITES MOLUCCANA. Willd.) A large tree, trunk generally erect, bark smooth olive-colored, branches numerous, young shoots covered with much stellate pubescence, leaves about the ends of the branchlets lanceolate or rhomboid ovate to cordate on the large trees, often 3-5 lobed on saplings, margins often scollop-toothed, stellately pubescent when young, in age more glabrous but more or less silvery beneath, 4-8 inches long by 3-6 broad furnished with 2 large glands at the insertion of the petiole, petioles round about as long as the leaves, panicles terminal erect much shorter than the leaves clothed with stellate pubescence, flowers numerous small white, bracts subulate soon deciduous. *Male*, flowers terminal about 3 lines long most numerous, calyx stellately pubescent splitting irregularly into 2 segments, disk dilated into 5 glands between the petals, petals liguliform subglabrous about twice as long as the calyx, stamens 18-22 verticelled in 3-4 rows on the erect hemispherical column, filaments short thick hairy continued up between the anther-cells at the back and not distinguishable from the connective which is produced into a small obtuse point beyond the introrse cells ; *female*, flowers sessile in the divisions of the panicle, calyx and corol as in the male only the latter is generally pubescent, ovary densely stellato-pubescent 2-celled, styles short, stigmas incurved acute, drupe 2-celled (sometimes only 1-celled by abortion), fleshy roundish a little compressed, pretty smooth, somewhat pointed, slightly 4-ribbed olive colored when ripe, cells lined with a firm smooth brown integument ; nuts two thick and very hard. *Willd. Sp. Pl. vol.* iv. *p.* 590. Jatropha Moluccana, *Linn. Sp. Pl. ed.* 1 *p.* 1006. Aleurites triloba, *Forst Roxb. Fl. Ind.* iii. 629. Juglans Cammirium, *Lour.*

This handsome tree is met with wild in parts of Wynad, though probably escaped from cultivation, as it is supposed to have been introduced into this Presidency from the Malay Archipelago ; it is much cultivated in various parts of India, and generally known in this Presidency as the Belgaum Walnut. It is indigenous in many parts of the Eastern Archipelago, and is in cultivation in various parts of the world ; it is very ornamental, but its timber is not, I believe, of any value ; the kernels are eaten and somewhat resemble walnuts, and they yield by expression about 50 *per cent. of a fine clear oil which can be used for the table as well as burning. In the Sandwich Islands a large trade is carried on in this oil, and the kernels strung on sticks are employed as candles, they burn well and slowly and give a clear light. The tree is well worth cultivating for ornamental purposes or shade, and it grows readily from seed, any amount of which can be procured at Manantoddy in the Wynad.*

Analysis.

1. *Male* flower bud.
2. Male flower.
3. Male flower spread out, showing the glands of the disk alternate with the petals and the stamens 22 in 4 verticels on the raised receptacle.
4. A petal glabrous.
5. Inside view of the introrse anther with its hairy filament.
6. Outside view of the same the filament running right up the back between the cells and not distinguishable from the connective, which is produced into an obtuse point beyond the cells.
7. Female flower bud.
8. Female flower.
9. Calyx and ovary.
10. Ovary and its 2 deeply bifid-styles.
11. A petal furnished with stellate pubescence.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely 2 cells, ovules solitary
14. Very young fruit. (All drawn from living specimens I have no fruit, so I have taken the description of it from Roxburgh.)

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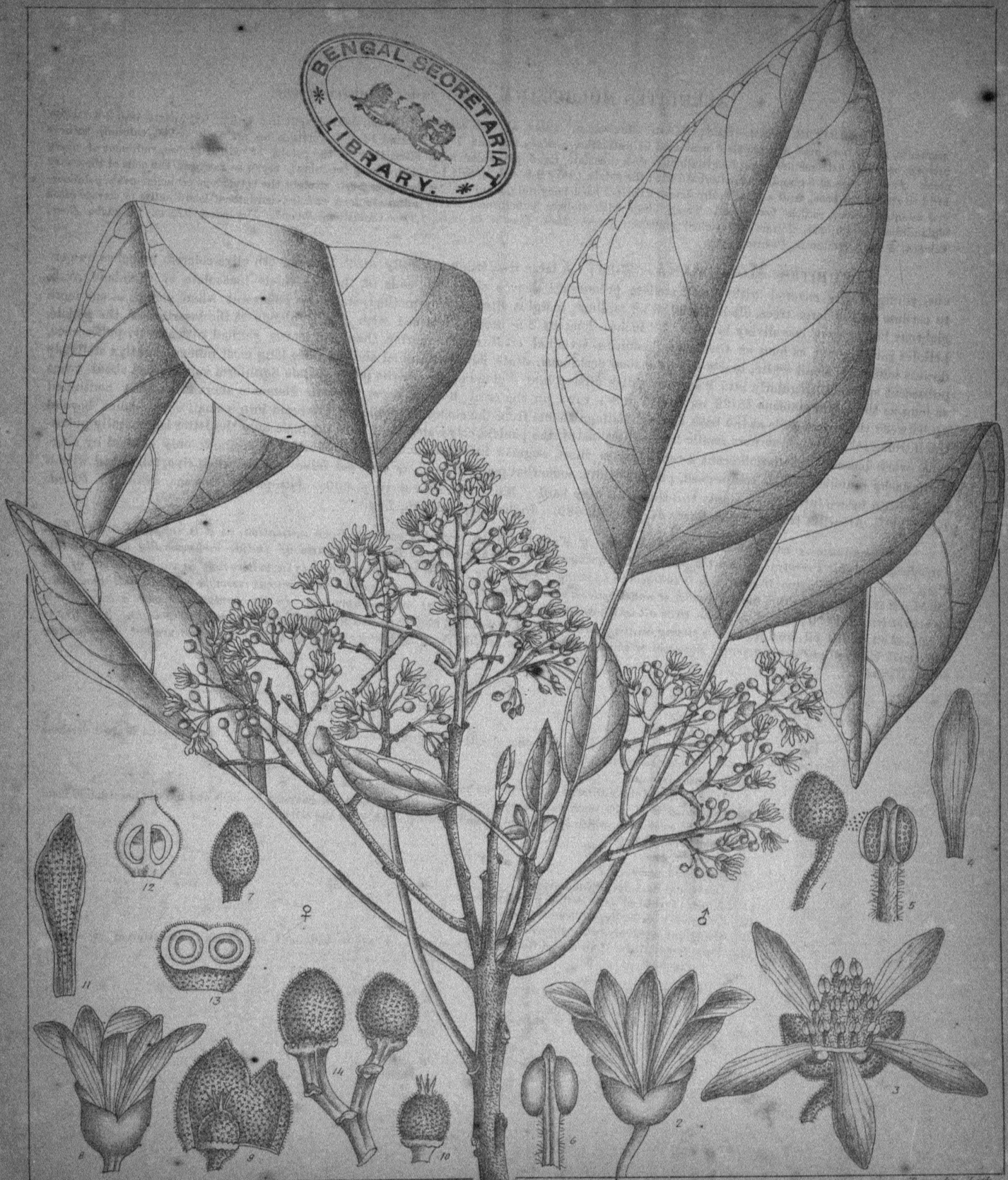


Hewittes Moluccana (Willd.)

ORDER LV—LOGANIACEÆ.

Gen. Char. Flowers regular. Calyx free with 4 or 5 teeth, lobes or segments, very rarely reduced to 2 or in a very few species 6 or 7. Corolla with 4, 5, (or rarely more than 5) lobes valvate contorted or otherwise imbricate in the bud. Stamens as many as corolla-lobes, alternate with them, inserted in the tube (or very rarely reduced to 1), anthers 2-celled, the cells opening longitudinally. Ovary free, 2-celled or very rarely 3-to 5-celled or imperfectly divided, style single or separating into 2 at the base, with an entire or 2-lobed stigmatic summit; ovules 1 or more in each cell of the ovary or to each placenta. Fruit a berry or capsule. Seeds albuminous. Embryo straight, often oblique, with leafy or small cotyledons. Trees, shrubs, climbers, or rarely herbs. Leaves opposite usually connected by interpetiolar stipules or at any rate by a raised line.

This order is not one of much importance to the forester. The genus Strychnos yields 2 well known trees, the Nux vomica and the Clearing nut (common throughout the Presidency) and several large climbers (western forests). Fagræa yields 3 or 4 ornamental but useless trees with large whitish flowers (western forests and Ceylon). Buddleia one common shrub or very small tree, and Gærtnera 5 shrubs (Ceylon). Besides these the genus Gardneria is represented in our western forests by 1 large climber, G. ovata, the genus Mitreola by a small herb, M. oldenlandioides (western jungles), and the genus Mitrasacme by 2 minute herbs, M. Indica, Wight, and M. capillaris, Wall, (fields, &c., on the west coast.) The order is closely allied to Rubiaceæ in some of its genera, but differs in its free ovary, some species of Gærtnera might well be set down as Psychotrias if this is not borne in mind.

* Ovules several in each cell.	
Corol valvate, fruit a berry with a hard rind...	STRYCHNOS.
Corol imbricate.	
Fruit a capsule ...	BUDDLEIA.
Fruit a berry ...	FAGRÆA.
* Ovules solitary in each cell ..	GÆRTNERA.

STRYCHNOS. LINN.

For Gen. Char. see letter-press to Pl. ccxliii.

1. STRYCHNOS NUX-VOMICA, *Willd.*—For description, &c. see Pl. ccxliii.

2. STRYCHNOS POTATORUM, *Linn.*—A good sized tree, bark deeply cracked, no spines or tendrils, leaves ovate to elliptic acute membranaceous glabrous somewhat 3-5-nerved at the base, penniveined above, about 3 inches long by 1½ broad, petioles 2-3 lines long, stipules connate, corymbs axillary or from the old axils, much shorter than the leaves, flowers fragrant greenish-yellow 4-5 lines long, calyx scarcely more than 1 line long, corol hairy in the jaws, berry shining black when ripe, globose, 7-8 lines in diameter 1-seeded. *Roxb. Fl. Ind.* i. 576;—*Wight Ill. tab.* 156.

This tree is well known as *the Clearing nut,* and is called in Telugu *Chilla,* and in Ceylon Injini; it is not uncommon throughout this Presidency, and in Ceylon, in the dry forests of the plains and lower slopes of hills up to 3000 feet, and is also found in Madagascar. The timber is hard and durable, and much in use for ploughs, building purposes, cart wheels, &c. The ripe seeds are dried and sold in every market to clear muddy water, one of the seeds is rubbed for a minute or two round the inside of the chatty and the water soon becomes clear.

STRYCHNOS CINNAMOMIFOLIA, *Thw.*, and S. COLUBRINA, *Linn.*, are gigantic creepers in our western forests, and I have one or two allied (doubtfully distinct) species (large climbers). S. LAURINA and S. MINOR are Ceylon climbers.

BUDDLEIA. LINN.

Gen. Char. Calyx 4-toothed or 4-lobed. Corolla with a short or long tube and spreading or rarely erect limb of 4 short broad lobes, imbricate in the bud. Stamens 4, the anthers almost sessile. Ovary 2-celled, with several ovules in each cell. Style entire. Capsules opening septicidally in 2 entire or bifid valves, leaving the placenta free in the centre. Seeds numerous, small, more or less flattened or obscurely winged. Shrubs or rarely trees, with more or less of a mealy or woolly tomentum, rarely quite glabrous. Leaves opposite, entire or toothed. Flowers in cymes or clusters, either axillary or in terminal racemes or panicles, in some species occasionally, but rarely pentamerous.

1. BUDDLEIA ASIATICA, *Lour.*—A small tree or shrub, with the young branches, inflorescence, and under side of the leaves covered with a white or yellowish tomentum, sometimes very thin and close or mealy, sometimes very thick and almost woolly. Leaves lanceolate, acuminate, 3 to 6 inches long, entire or serrulate, on a very short petiole, usually glabrous on the upper side. Flowers in dense clusters, in racemes of 3 to 8 or 10 inches long, which are sometimes single and terminal, but more frequently 3 or more together at the ends of the branches or in the upper axils, forming a terminal panicle. Calyx usually nearly 1 line long, cottony or woolly. Corolla-tube shortly exceeding the calyx; the lobes very short, obtuse or spreading. Capsule 2 to 3 lines long, usually spreading or reflexed. *Benth. Fl. Hongkong, p.* 231. B. neemda, *Ham. Benth. in DC.* x. 446. B. discolor, *Roth.*;—*Wight's Icones* 894. B. Missionis, *Wall.*?

A common shrub or small tree in hilly districts throughout the Presidency, up to 5000 feet elevation, and a very ornamental plant; it extends to Nepal, Malacca and the Malay Archipelago.

Analysis of Genera, Pl. XXI, fig 4.

1. A portion of a raceme.
2. A flower bud with its bracteole, lobes of corolla imbricate.
3, 4. Full flowers.
5. Corolla opened.

6. Calyx opened to show ovary and style.
7. Anthers, front and back view.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. Fruit. (Drawn from living specimens collected on the Nilgiris.)

FAGRÆA. Thunb.

For Gen. Char. see letter-press to Pl. ccxliv.

1. Fagræa Coromandelina, *Wight.*—For description, &c. see Pl. ccxliv.

2. Fagræa obovata, *Wall.*—A small or middling sized glabrous tree often subscandent, leaves ovate or obovate cuneate subapiculate tapering at the base and slightly decurrent on the petiole, 5-7 inches long thick almost fleshy without veins, petioles 1 inch long flattened above concave at the base dilated at the base into an erect concave ligula, peduncles axillary and terminal about 5 together, elongated 3-flowered, flowers white or yellowish-white fragrant, calyx-segments broad ovate obtuse, corol about 2 inches long infundibuliform gradually widening upwards, lobes obtuse spreading, berry ovate brown shining, the numerous brownish seeds immersed in soft pulp. *Wall. in Roxb. Fl. Ind. (Ed. Wall. & Carey) vol.* ii. *p.* 33. F. Malabarica, *Wight Icones tab.* 1317.

Not uncommon in our western moist forests and in Ceylon and Silhet; it is nearly allied to the last species but differs in its smaller flowers and number and length of the peduncles, and has a very different appearance.

3. Fagræa Zeylanica, *Thunb.*—is a Ceylon tree closely allied to obovata, but differing in its less scandent habit, much longer flowers, and more rounded fruit. Ceylon, Central Provinces, called Attamburu.

4. Fagræa Gardneri, *Thw.*—is a Ceylon scandent plant allied to obovata, with weaker more scandent branches, more crowded leaves, longer calyx, and its pair of bracteoles at its immediate base instead of ½ way down the pedicel. All 4 species are closely allied, and perhaps rather varieties than distinct species.

GÆRTNERA. Lam.

Gen. Char. Calyx 5-or rarely 4-lobed or toothed. Corolla-tube cylindrical; the limb of 5 or rarely 4 lobes, valvate in the bud. Stamens as many, included in the tube. Ovary 2-celled, with 1 erect ovule in each cell. Fruit succulent, indehiscent, but readily separating into 2 cocci. Shrubs or small trees. Leaves opposite, entire, with interpetiolar stipules often forming a short sheath within the leaves. Cymes or panicles terminal, trichotomous.—Sykesia, *Arnt.*

A genus not distinguishable from Psychotria in Rubiaceæ, except by its superior ovary and fruit and the former is sometimes slightly inferior at its base.

1. Gærtnera Kœnigii, *Arnt.*—A large shrub, young branches minutely puberulous, leaves ovate to oblong or obovate suddenly and shortly acuminate rather attenuated at the base glabrous, 3-7 inches long by 1-3 broad, petioles 3-6 lines long, stipules very large sheathing entire or bifid at the apex; cymes bracteate compound about as long as the leaves puberulous as are the calyx and corol, pedicels short with a bract at the base, calyx small truncate and entire to more or less 5-lobed furnished with a bracteole at its base, corol greenish about 3 lines long hairy in the jaws, stamens inserted about the middle of the tube, filaments hairy very short with the style elongate or as long or longer than the corol with the style generally short, stigma 2-lobed, lobes flat on the inner face, fruit subspherical bluish 5-6 lines in diameter. *Wight Icones tab.* 1318; (with long filaments) Gært. divaricata, *Thw. En. Pl. Zey.* 425; (with short filaments) Pristidia, *Thw. l. c. p.* 149. Sykesia Kœnigii, *Arnt. pug.* 35. G. acuminata, thyrsiflora, et oxyphylla? *Benth. Linn. Journ. vol.* 1. *p.* 112.

Ceylon, very abundant close to Galle, also in the Central Provinces; quite a Psychotria, except in its superior fruit, and nearly superior ovary, the filaments are sometimes long and sometimes short as in many Rubiaceæ.

Analysis of Genera, Pl. XXI, fig. 3.

1. A stipule.
2. A flower bud.
3. A full flower, corol lobes valvate.
4. Calyx, ovary, style and stigma.
5. Corol opened shewing the stamens with short filaments, some flowers have elongated filaments and a shorter style (as in Psychotria and Hedyotis in Rubiaceæ.)
6. Anthers, front and back view.
7. Ovary cut transversely, 2 cells.
8. Ovary cut vertically, ovules erect, this shews the ovary slightly inferior at its base which it generally is, but the fruit is wholly superior. (Drawn from dried specimens collected near Galle in Ceylon.)

2. Gærtnera rosea, *Thw.*—A shrub 8-10 feet high, ramuli bicostate, leaves elliptic or ovato-lanceolate with a long and acute acumination, narrowed at the base into a short petiole, 1¼-3 inches long by ¼-1¼ inch broad, stipules keeled biaristate joined into a tube, flowers terminal tern sessile or subsessile, calyx tubular 1 line long irregularly 4-6 denticulate, corol 8-10 lines long rosy-purple, lobes 4 linear much shorter than the tube, fruit subspherical pale blue 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 201.

Ceylon, Ambagamwa and Saffragram districts, up to 2000 feet elevation.

3. Gærtnera Walkeri, *Arnt.*—A shrub 8-10 feet high, branches terete glabrous, leaves oblong or lanceolate with a long acute acumination, 1½-4 inches long by ½-1½ inches broad, petioles 2-5 lines long, stipules joined into a tube, truncate or

shortly acuminate or bifid, cymes terminal glabrous generally 5-flowered about equal to the leaves, corol-tube elongate villous within, fruit subspherical blue. *Wight Ill.* ii. *tab.* 156*b.*, and *Thw. En. Pl. Zey. p.* 202. Sykesia Walkeri, *Arnt. pug.* 36. 354.

Ceylon, Central Provinces, 3000-4000 feet elevation.

4. GÆRTNERA GARDNERI, *Thw.*—A shrub 8-10 feet high, ramuli terete minutely puberulous, leaves glabrous narrow-lanceolate acutely acuminate, acute at the base, short-petioled, 1-2½ inches long by 2-5 lines broad, stipules sheathing a little acuminate and bifid, cymes puberulous generally 3-flowered and shorter than the leaves, flowers erect and with the fruit very similar to the preceding species but a little larger. *Thw. En. Pl. Zey. p.* 202.

Ceylon, Central Provinces, 5000-7000 feet elevation.

5. GÆRTNERA TERNIFOLIA, *Thw.*—A shrub 4-6 feet, ramuli puberulous 3-costate, leaves verticelled in threes or sometimes only opposite glabrous rigid linear mucronate, acute at both ends, veinless, short-petioled, 4-7 lines long by ½ to 1 line broad, costa prominent beneath, stipules short acuminate joined at the base; flowers terminal solitary, pedicels shorter than the leaves puberulous, calyx shortly-campanulate acutely 5-toothed puberulous bracteolate at the base. Corol white 5-6 lines long a little campanulate glabrous outside villous within the tube, lobes shorter than the tube, stamens inserted at the middle of the tube, berry subspherical blue 4 lines in diameter. *Thw. En. Pl. Zey. p.* 202.

Ceylon, Ambagamwa district near Adam's Peak, 4000-5000 feet.

ORDER LVI—BORAGINEÆ.

Flowers regular or nearly so. Calyx free, of 5 rarely 4 or 6 or more divisions or teeth or rarely irregularly split. Corolla with a long or short tube, and 5 rarely 4 or 6 or more lobes, imbricate or induplicate in the bud, stamens as many as corolla-lobes or very rarely fewer, inserted in the corolla-tube and alternate with its lobes; anthers 2-celled, the cells opening in longitudinal slits or rarely in terminal pores. Ovary superior, entire or 4-lobed rarely 2-lobed, either 4-or 2-celled with 1 ovule in each cell or 2-celled with 2 ovules in each cell, (in all cases formed of 2 carpels); style terminal or inserted between the lobes; ovules laterally attached, ascending or pendulous. Fruit either a drupe with the endocarp entire or separating into 2 carpels or 4 pyrenes, or dry and separating into 4 rarely 2 nuts. Seed with a thin testa; albumen none or scanty; embryo straight; cotyledons flat and rather thick or rarely folded; radicle short. Herbs, usually rough with coarse hairs, or in the drupaceous genera sometimes trees or shrubs with a softer indumentum or glabrous. Leaves alternate or very rarely opposite, usually undivided, entire or toothed, very rarely deeply lobed. Flowers in one-sided spikes or racemes, rolled back when young and often forked or dichotomous or rarely in irregularly-branched panicles or solitary. Bracts often not immediately subtending the pedicels and sometimes entirely wanting; bracteoles very rarely present.

This order is of little importance to the forester. Cordia gives 8 trees in this Presidency and 2 in Ceylon, chiefly small trees of no value. Ehretia is represented by 5 small trees; 3 introduced Cordias are found in our gardens. Of plants not coming within the scope of this Flora, Rhabdia viminea (Ehretia cuneata, Wight Icones tab. 1385) *is an under shrub common in beds of rivers, and the following genera are represented by herbaceous plants, Tournefortia, Heliotropium, Coldenia, Cynoglossum, Trichodesma. Cordia Macleodii is a valuable timber tree in the Nagpore country, where it is known by the name of Deyngan, but it does not extend to our limits.*

Tribe I.—Ovary entire, style terminal, fruit drupaceous or dry.

Fruit a drupe.
- Style twice forked... ... ... CORDIA.
- Style 2-lobed ... ... EHRETIA.

CORDIA. PLUM.

For Gen. Char. see letter-press to Plate ccxlv.

1. CORDIA WALLICHII, *G. Don.*—For description, &c. see Plate ccxlv.

2. CORDIA MYXA, *Linn.*—A handsome tree, with a dense coma, glabrous or the foliage scabrous-pubescent. Leaves on rather long petioles, from ovate to orbicular, very obtuse or shortly acuminate, entire or irregularly sinuate, 3 or 5-nerved at the base, usually 2 to 3 inches long. Flowers not large, polygamous, in loose pedunculate cymes or panicles. Calyx membranous, about 3 lines long, entire and closed over the corolla in the bud, opening irregularly into short lobes without prominent ribs when the flower expands, hardened, broadly cup-shaped, and irregularly and broadly toothed or lobed under the fruit. Corolla-tube oblong-cylindrical, slightly contracted at the throat, nearly as long as the calyx, glabrous inside and out; lobes narrow, recurved, as long as the tube. Stamens exserted, but not exceeding the corolla-lobes; anthers oblong-linear. Style short, with 4 long filiform branches stigmatic along the inner side. Drupe ovoid or nearly globular, pale yellow the pulp very viscid, the putamen very hard, usually 1 or 2-celled, with 1 seed in each cell. *Wight. Illustr. t.* 169. C. dichotoma, *Forst. R. Br. Prod.* 498. C. Brownii, *DC. Prod.* ix. 499. C. latifolia, *Roxb. DC. Prod.* ix. 478. C. ixiocarpa, *F. Muell. Fragm.* i. 59.

A common tree in many parts of the presidency and much in cultivation about native villages, it is also widely dispersed over tropical Asia and in Queensland and tropical Africa. Specimens with all the flowers male have usually a looser more slender inflorescence than those with all or nearly all perfect flowers. The tree is called Gondee and Lusora in Hindostanee, Irkee and Peddà bŏkee in Teligu; and Verasu in Tamil. The fruit is eaten, and is the Lebestan of the Indian Materia Medica, being employed as a pectoral medicine, it is very mucilaginous. The wood is said to be one of the best for producing fire by friction, and I have known ploughs made out of it, but it is generally set down by the natives as a very inferior timber only fit for firewood, though some other Cordias yield good timber.

3. Cordia octandra, *DC.*—A small tree, branches numerous much spreading, bark smooth olive-colored, leaves alternate on longish petioles, ovate-cordate serrate acuminate a little harsh with few hairs, 4-6 inches long by 2-4 broad. Flowers white middling sized in long peduncled dichotomous cymes, calyx subcylindric 3-5 toothed hairy inside, corol with a cylindric tube as long as the calyx, lobes 7-9 oblong recurved, filaments about 8 hairy inserted on the tube of the corol below its middle. *DC. Prod.* ix. 477. C. serrata, *Roxb. Fl. Ind.* i. 591 (not *Juss.*)

Travancore, at no elevation.

4. Cordia monoica, *Roxb.*—A small tree, bark greyish, leaves alternate ovate slightly repand, 3 rarely 5-nerved, very scabrous, about 3 inches long by 2 broad, petioles round scabrous about 1 inch long, flowers male and hermathrodite mixed rather small white, male with rudiment of an ovary but no style. Cymes short two-forked with the branchlets recurved, drupe size of a cherry acute yellow full of glutinous pulp (as in Myxa.) *Roxb. Fl. Ind.* i. 592.

Very common in many of our forests (up to 2000 feet) on both sides of the presidency, it is a scraggy tree of no value.

5. Cordia polygama, *Roxb.*—A small tree, bark pretty smooth dark olive-colored, branches spreading, leaves alternate petioled ovate to cordate entire or slightly scollop-toothed, soft and villous when young, scabrous in age, 1-6 inches long by ¾ to 4½ broad, flowers male and hermathrodite on different trees, the cymes pubescent, in the male more divided. Calyx narrow-campanulate 4-5 toothed villous outside, corol funnel-shaped, lobes 4-5 linear revolute. Stamens 4-5, ovary ovate, in the male spherical and abortive and without a style, drupe oval as large as a black-currant, smooth yellow filled with mucilaginous pulp, nut very hard ovate longitudinally perforated through the centre. *Roxb. Fl. Ind.* i. 594.

Mountains on the eastern side of the Presidency.

6. Cordia Rothii, *Ræm. and Sch.*—A small tree, leaves sub-opposite entire from lanceolate obtuse to spathulate tapering at the base scabrous, 3-5 inches long by 1-1½ inch broad, petioles channelled 3-5 lines long, corymbs dichotomous divaricate, flowers numerous small white, 4-5 cleft, pedicelled, calyx obsoletely 4-5 toothed, those of the fruit repandly denticulate, stamens 4-5, drupe roundish smooth yellow size of a large pea. *Ræm. and Sch. Syst.* 4, *p.* 798. Cordia angustifolia, *Roxb. Fl. Ind.* i. 595. (not *Ræm. and Sch.*) C. cuneata, *Heyne*;—*Wight Icones tab.* 1379.

Common about our western forests and in Mysore, &c.

7. Cordia Perottetii, *DC.*—A small tree, branches terete, the younger ones, petioles and peduncles velutino-scabrous rufescent, leaves petioled elliptic obtuse at both ends entire, scabrous above somewhat velvetty beneath, up to 3 inches long by 1½ broad, petiole 4-5 lines long. Cymes shorter than the leaves sub-racemose, calyx oblong obtuse irregularly toothed tomentose, corol-tube equalling the calyx 4-cleft, lobes oblong reflexed. *DC. Prod.* ix. 482;—*Wight Icones tab.* 1381.

Not uncommon in our western forests, Bellary, Cuddapah and South Arcot.

8. Cordia fulvosa, *Wight.*—A small tree, branches glabrous terete, young shoots, leaves, &c., fulvo-pubescent, leaves ovate obtuse at both ends sometimes suborbicular, entire or repand toothed, smooth dull or somewhat hoary with very short fulvous pubescence, 1½-2 inches long by 1-1¼ bread, petioles about 6 lines long, flowers congested at the apex of the branches of the cymes, in bud obovate and villous at the apex, calyx subcampanulate irregularly 4-6 toothed, corol deeply 4-6 cleft, lobes obovate emarginate glabrous, tube hairy, stamens 4-6, filaments glabrous inserted at the mouth of the tube. *Wight Icones. tab.* 1380.

Forests on the west side of the Presidency.

9. Cordia diversa, *Thw.*—A small tree, young branches tomentose, leaves ovate a little acuminate rounded at the base, 3-nerved scabrous above, beneath fusco-tomentose, 2-4 inches long by 1-2½ broad, petioles ½-1 inch long, panicles few-flowered tomentose, calyx obconical 3 lines long 3-4 toothed tomentose on the outside particularly at the apex, glabrous within, corol glabrous a little longer than the calyx 5-lobed, drupe round ½ an inch in diameter. *Thw. En. Pl. Zey. p.* 214.

Ceylon, hot drier parts of the island.

10. Cordia oblongifolia, *Thw.*—A small tree subscandent, branches terete glabrous, leaves glabrous oblong shortly acuminate very minutely reticulato-venose, subacute at the base, 2-5 inches long by 1-2½ inch broad, petioles 1 inch long, panicle sparingly pilose, calyx cylindrical 3-5 toothed internally villous, 4 lines long, corol 5-7 lobed, lobes oblong reflexed, the tube equalling the calyx, fruit nearly an inch in diameter rounded acuminate. *Thw. En. Pl. Zey. p.* 214.

Ceylon, Central Provinces up to 2000 feet.

Cordia speciosa, *Willd.* (C. Sebestena, *L.*) and Cordia tectonifolia, *Wall.*; small trees with handsome scarlet flowers in our gardens in the plains, are introductions from the West Indies; and Cordia subcordata, *Lam.* (C. campanulata, *Roxb.*), has also been introduced into this Presidency from the Moluccas.

EHRETIA. Linn.

For Gen. Char. see letter-press to Pl. ccxlvi.

1. Ehretia lævis, *Roxb.*—For description, &c. see Pl. ccxlvi.

2. Ehretia aspera, *Roxb.*—A small bushy tree, young shoots downy, leaves alternate ovate scabrous above, downy beneath, 2-3 inches long by 1-2 broad, petioles channelled about 1 inch long, corymbs terminal dichotomous dense with the

branches recurved and 2-forked, flowers very small white, calyx-segments ovate downy outside, corol-tube gibbous, fruit size of a pepper-corn red marked with 4 angular elevations, corresponding with the angles of the 4-celled smooth nut. *Roxb. Fl. Ind.* i. 598.

Common throughout the Presidency in dry barren places.

3. EHRETIA OVALIFOLIA, *Wight.*—A small tree or only a large shrub, subglabrous, leaves oval to somewhat obovate, obtuse or with a short blunt acumen, smooth on both sides with hollow hairy glands in the axils of the veins beneath or sometimes more or less hairy on the underside, 1½-2 inches long by about 1 inch broad, petioles 6 lines long, cymes terminal or axillary dichotomously branched circinate, flowers secund short-pedicelled, calyx deeply 5-cleft slightly hairy, corol rotate, lobes reflexed, stamens exserted, drupe red size of a small pea. *Wight Icones tab.* 1383.

Common in the Coimbatore, Madura and Tinnevelly districts up to 2000 feet elevation, allied to aspera but with the leaves generally quite glabrous.

4. EHRETIA WIGHTIANA, *Wall.*—A large shrub or small tree glabrous, ramuli slender smooth, leaves elliptico-lanceolate subacuminate, tapering at the base into the slender petiole, entire glabrous on both sides, 1½-2¼ inches long by 6-8 lines broad, petioles 6-8 lines long, cymes terminal compact dichotomous, branches revolute, flowers secund subsessile, calyx 5-toothed about 1 line long, corol-tube funnel shaped 2½ lines long, stamens exserted, drupe size of a large pepper-corn. *Wight Icones tab.* 1384.

Tinnevelly ghats, up to 2000 feet, common.

5. EHRETIA BUXIFOLIA, *Roxb.*—A large ramous shrub or very small tree, leaves on the young branches alternate, on the older ones fascicled, sessile, wedge-shaped, apex tridentate very hard scabrous and shining, ½-1 inch long by ¼-½ inch broad; cymes axillary 2-6 flowered, pedicels very short, flowers small white, calyx 5-parted, segments lanceolate as long as the corol, corol campanulate, lobes 5-6, stamens 5-6 shorter than the corol, berry size of a pea succulent red, nut 5-6 celled. *Roxb. Fl. Ind.* i. 598.

Common throughout the Presidency, generally in dry barren places.

EHRETIA SERRATA, *Roxb.*—Found in some gardens, is an introduction from Northern Bengal.

ORDER LVII—SALVADOREÆ.

Calyx inferior 4-parted minute valvate, corolla membranaceous monopetalous 4-parted, lobes imbricate. Stamens 4 connecting the petals in a monopetalous corolla. Anthers round 2-celled bursting longitudinally. Ovary superior 1-celled with a single sessile stigma, ovule solitary erect. Fruit a berry 1-celled indehiscent, seed solitary erect, embryo amygdaloid without albumen. Cotyledons fleshy plano-convex fixed a little below their middle to a long axis, the radicle of which is enclosed within their bases. Small trees, leaves opposite leathery entire very obscurely veined; flowers minute in loose panicles.

This order only consists of a single genus which yields 1 small tree within our limits.

SALVADORA. LINN.

For Gen. Char. see Pl. ccxlvii.

1. SALVADORA WIGHTIANA, *Planch.*—For description, &c. see Pl. ccxlvii.

ORDER LVIII—BIGNONIACEÆ.

Flowers irregular. Calyx tubular or campanulate, truncate toothed or laterally split. Corolla-tube elongated or rarely short and campanulate; lobes 5, spreading, often arranged in 2 lips, variously imbricate or rarely induplicate-valvate in the bud. Stamens 2 or 4, in pairs or rarely 5 inserted in the tube, the fifth generally only a staminodium usually small rarely wanting. Anthers 2-celled the cells opening longitudinally. Ovary usually 2-celled, with 2 distinct placentas in each cell attached to the dissepiments, and either contiguous or separated by a considerable interval, or, in some genera, the dissepiment discontinued between the placentas, and the ovary then 1-celled or very rarely sub 4-celled, ovules several, often numerous to each placenta. Style filiform, with 2 short stigmatic lobes. Fruit a capsule, often elongated, opening loculicidally or septifragally in 2 valves, leaving the dissepiment free, or indehiscent, (in the tribe Crescentieæ.) Seeds transverse, usually flattened and bordered by a membranous wing, wingless (in Crescentieæ) without albumen. Embryo straight or rarely curved; cotyledons flat or fleshy; radicle next the hilum. Trees, shrubs or woody climbers (very rarely herbs.) Leaves opposite or rarely scattered, compound or rarely simple, without stipules. Flowers solitary in the axils or more frequently paniculate.

Tribe I. Bignonieæ.—Capsule dehiscing septifragally, the dissepiment being parallel.

Stamens 5, the 5th often sterile, anthers spurless	BIGNONIA.
Stamens 4, anthers spurred	MILLINGTONIA.

Tribe II. Catalpeæ.—Capsule dehiscing loculicidally, the dissepiment being transverse (i. e., attached before maturity to the centre of the valves.)

Calyx spathaceous ... ... SPATHODEA.
Calyx not spathaceous.
Capsule sub 4-celled ... ... HETEROPHRAGMA.
Capsule 2-celled.
Capsule 4 cornered or cylindric, the dissepiment cellular thick and corky, seed bony ... ... STEREOSPERMUM.
Capsule flat and winged ... ... PAJANELIA.

This order is represented by about 11 indigenous trees; the genus Bignonia gives 2, both common throughout the Presidency, one yielding a fair timber, the other worthless. Millingtonia 1 species, well known in a planted state as the cork tree. Spathodea 3 or 4, widely distributed over the Presidency, all good timbers. Heterophragma 1, a rare tree, timber good. Stereospermum 2, common throughout the Presidency, most useful timbers. Pajanelia 1, a most ornamental tree, confined to the west coast. Of introduced plants we have one very fine Spathodea from Birmah, a large tree common in our gardens. Kigelia pinnata, a large tree from Eastern Africa. Two species of Crescentia, American trees, and our gardens in the plains are gay with beautiful climbing species of Bignonia and Tecoma, chiefly introductions from tropical America.

BIGNONIA. L.

For Gen. Char. see letter-press to Pl. lxx. (The genus Calosanthes, *Blume*, with the 5th stamen fertile, is now included in this genus.)

1. BIGNONIA XYLOCARPA, *Roxb.*—For description, &c. see Pl. lxx.

2. BIGNONIA INDICA, *Linn.*—A tree, glabrous, bark smooth, leaves opposite bi-pinnate 4-6 feet long, leaflets short petioled obliquely-cordate to subcordato-ovate, acuminate entire, 3-6 inches long by 2-4 broad, racemes terminal erect secund rigid the lower ⅔ naked scabrous and somewhat quadrangular, flowers large (3½ inches long) fleshy dark dull reddish, fetid ; calyx coriaceous tubular truncated about 1 inch long, corolla with a short tube, limb 5-lobed sub 2-lipped somewhat fimbriately cut. Stamens 5 all fertile 2 somewhat longer than the others, filaments woolly at the base, anther-cells divaricate pendulous, disk fleshy somewhat 5-gonal, stigma bilamellate, capsule flat, siliqueform 2 feet long by 3 inches broad compressed somewhat curved with the convexity upwards, seed-wing delicate membranaceous. *Linn. Roxb. Fl. Ind.* iii. *p.* 110. Calosanthes Indica, *Blume* ;—*Wight Icones tab.* 1337-8. Bignonia pentandra, *Lour.*

Not uncommon in forests throughout the Presidency and Ceylon up to 3000 feet elevation, and sometimes cultivated in native gardens ; it is also found in Bengal, Java and Cochin China ; the timber is soft and useless, the tree is called Pana in Tamil, Pampana in Teligu, and Totilla in Ceylon ; the bark and capsules are astringent and are used in tanning and medicinally amongst the natives. Roxburgh says that it is a lofty tree on the eastern coast mountains, but as far as I have observed it is always a small tree on the west side of the Presidency.

MILLINGTONIA. LINN. F.

For Gen. Char. see letter-press to Pl. ccxlix.

1. MILLINGTONIA HORTENSIS, *Linn. f.*—For description, &c. see Pl. ccxlix.

SPATHODEA. BEAUV.

For Gen. Char. see letter-press to Pl. lxxi.

1. SPATHODEA FALCATA, *Wall.*—For description, &c. see Pl. lxxi.

2. SPATHODEA RHEEDII, *Wall.*—A good sized handsome tree, leaves unequally pinnate 12-15 inch long, leaflets 2-3 pair with an odd one membranaceous glabrous but rather rough with minute scale-like speeks, oval-lanceolate to almost rhomboid very oblique and unequal-sided at the base, acuminate at the apex, entire or with a few large coarse serratures here and there on the margins, 3-4 inches long by 2-2½ inches broad, petiolules 4-5 lines long, racemes terminal much shorter than the leaves about 3-flowered, calyx sub-glabrous 1½ inches long, corol white funnel-shaped about 6 inches long, tube long slender gradually widening near the apex, lobes somewhat curled and crenulate at the margins, stigma 2-lipped the lobes flat acute, capsule siliqueform subcylindric generally more or less curved about 8 inches long, septum thickened in the middle, seed-wing thickish opaque truncated. *Wall. DC. Prod.* ix. *p.* 206 ;—*Wight Icones. tab.* 1339.

Common about Tellicherry, and elsewhere in the plains of Malabar, and in Ceylon, also found in the Eastern Archipelago (Timor), very showy when in blossom.

3. SPATHODEA CRISPA, *Wall.*—A handsome tree of considerable size, young parts pubescent, leaves unequally pinnate 6-10 inches long, leaflets 1-3 pair with an odd one submembranaceous glabrous ovate to oblong entire or somewhat repand generally with a very unequal base, furnished with a long acumination at the apex, 3-4 inches long by 1½-2 broad, opposite petiolules 9-10 lines, the terminal one often 2 inches long, racemes terminal 3-7 flowered, pedicels 8-9 lines long, calyx 9-10 lines long puberulous, corol hypocrateriform white fragrant 2-2¼ inches long, the tube slender, the lobes much curled and crisped, capsule 12-15 inches long ½ an inch in diameter obtusely acuminated brown and slightly scabrous, septum thick and spongy. *Roxb. Fl. Ind.* iii. 104.

Not uncommon in subalpine forests throughout the Presidency, in Cuddapah and North Arcot it is well known by its Tamil name Poombadri. The leaves are very often trifoliate, the beautiful white flowers only open towards the evening and fall off early the next morning ; the timber is much esteemed by the natives, it is very similar to that of Stereospermum suaveolens, and is in use for building and many other purposes.

4. SPATHODEA ARCUATA, *Wight.*—A tree, leaves unequally pinnate, leaflets 4-5 pairs, from ovate subacute to orbicular unequal at the base entire, softly pubescent when young afterwards glabrous, 2½ inches long by 1¼ broad, petiolules 2 lines long, racemes terminal elongated many flowered, calyx cylindrical oblique pubescent on the outside, about 1 inch long, corolla-tube slender 2-2½ inches long, lobes fimbriate at the margins, capsule arcuate compressed 8-12 inches long by about 1 inch broad. *Wight Icones tab.* 1340.

Palghat and Coimbatore jungles, the flowers expand in the evening and drop in the morning. I have no specimens of this tree and suspect it is only a variety of S. cripsa ; of that species I have numerous specimens, but they have all of them long petiolules (9-10 lines), and never more than 5 leaflets.

5. SPATHODEA ADENOPHYLLA is very common in our gardens in the plains, but is an introduction from Birmah.

HETEROPHRAGMA. DC.

Gen. Char. Calyx campanulate 3-cleft, corol tube broad, lobes 5 spreading obtuse waved, stamens 4 fertile with a 5th sterile, anther cells subdivaricate glabrous, disk glandular encircling the base of the ovary, style filiform, stigma 2-cleft, lobes subulate, capsule rigid oblong acuminate 2-valved sub 4-celled, the septum enlarged in the middle on each side with a sharp ridge which touches the sides of the valve nearly dividing the 2 cells into 4, seeds broadly winged. A large tree, leaves opposite or verticelled in threes, glabrous, simply pinnate with 4-5 pairs of leaflets, panicle terminal.

1. HETEROPHRAGMA ROXBURGHII, *DC.*—A large tree with a tall straight trunk, bark grey with a few scabrous spots, branches numerous spreading, leaves about the ends of the branches unequally pinnate 1-2 feet long, leaflets 4-5 opposite pairs ovate to oblong acute serrate glabrous, panicle erect dense many-flowered downy, bracts scarcely any, flowers large rosy very fragrant, calyx downy, capsule erect straight linear pointed pretty smooth 12 inches long by 2 broad.—Bignonia quadrilocularis, *Roxb. Fl. Ind.* iii. 107.

I met with this tree abundant in the Godaveri jungles many years ago, and it occurs on the Bombay ghats, and probably in our western forests, but I have never met with it in the latter, and have no specimens at hand ; it is called Warus in the Bombay Presidency ; it flowers in March and April ; the wood is strong and in use for various purposes.

STEREOSPERMUM. CHAM.

For Gen. Char. see letter-press to Pl. lxxii.

1. STEREOSPERMUM CHELONOIDES, *Willd.*—For description, &c. see Pl. lxxii.

2. STEREOSPERMUM SUAVEOLENS, *Roxb.*—A good sized tree, bark ash-colored and rather scabrous, leaves opposite unequally pinnate 1-2 feet long, leaflets 2-4 opposite pair oval to ovate with a narrow bluntish acumen, entire or slightly serrate, downy on both sides when young, glabrous but harsh in age, the upper pair and the odd leaflet 6 inches long by 3-4 inches broad, the lower ones smaller, petiolules swelled at the base roundish 4-5 lines long, panicles terminal compound downy and rather viscid, flowers dark dull-crimson very fragrant, about 1½ inches long, calyx rather villous on the outside, corol woolly in the throat. Capsule very long siliqueform cylindrical.—Bignonia suaveolens, *Roxb. Fl. Ind.* iii. *p.* 104.

A very common tree throughout the Presidency and in Bengal; it is known by the same Tamil and Telugu names as S. chelonoides, and is called Hooday and Billa in Canarese ; the wood is much esteemed and much in use, it is very similar to that of chelonoides, only a little redder. The tree is called Purul on the Bombay ghats ; the roots are valued in Ceylon as a tonic ; the tree is often planted about native gardens and temples.

PAJANELIA. DC.

Gen. Char. Calyx coriaceous oblong pentagonal 5-cleft, teeth acute or bifid ; corol coriaceous, tube short broad, throat wide campanulate, lobes 5 rounded ; stamens 4 fertile a 5th sterile scarcely shorter than the others, anther-cells divaricate reflexed ; stigma 2-lobed clavate ; capsule flat with a broad wing on both sides, partition contrary to the valves, seeds roundish flat thinly winged except at the base. A tree, leaves opposite unequally pinnate, panicles thyrsiform erect many-flowered, flowers large purplish. *DC. Prod.* ix. 227.

1. PAJANELIA RHEEDII, *Wight*—A small weak tree, leaves 2-5 feet long, common petiole angled, leaflets many pair opposite subglabrous but harsh in age, obliquely falcato-ovate or oblongo-ovate with a long fine acumination, very unequal sided and very oblique at the base, 4-8 inches long by 1¾ to 3¼ broad, the primary veins (10-12 on one side and 6-8 on the other) and the reticulated veinlets and venules very prominent beneath, petiolules 2 lines long, flowers 3½-4 inches long, calyx puberulous, corol-tube contracted below the middle glabrous on the outside, lobes much crisped on the outer margin and furnished on the inner edges with a line of dense woolly hair, and slightly hairy on the outside. Capsule 12-15 inches long cuspidate. *Wight Icones tab.* 1343-4.

Common on the Malabar ghats up to 2000 feet, and about fields and waste places in the plains of that district ; it is always a small weak tree and of no value except for ornament, but for its superb foliage or for its flower it is a most desirable plant for parks or gardens.

Anomalous genus allied to Bignoniaceæ in its fruit, and to Jasmineæ in its flower.

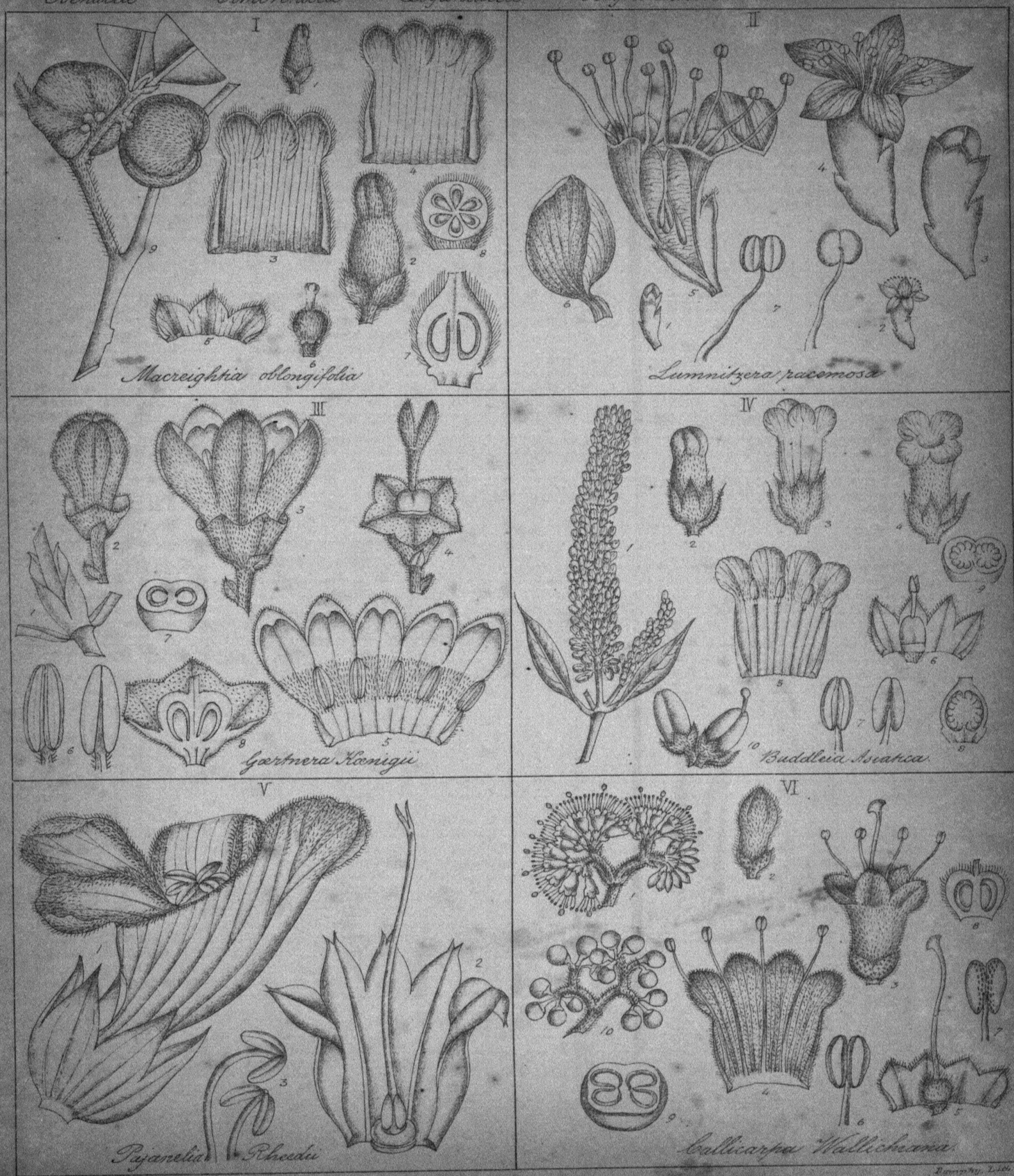
SCHREBERA. ROXB.

For Gen. Char. see letter-press to Pl. ccxlviii.

1. SCHREBERA SWIETENIOIDES, *Roxb.*—For description, &c., see Pl. ccxlviii

ANALYSIS OF GENERA

Ebenaceæ *Combretaceæ* *Loganiaceæ* *Bignoniaceæ* *Verbenaceæ*



GLOCHIDION NEILGHERRENSE. (Nat. order Euphorbiaceæ.)

GLOCHIDION. *Forst.*—GEN. CHAR. Flowers monœcious, in axillary clusters. Perianth-segments 6, or rarely 5-4 free or shortly united, imbricate in the bud. Glands none. *Male*, stamens 3 to 5 or rarely more. Anthers oblong, sessile on a central column, tipped by their projecting connectivum. *Female*, ovary 3 to 10-celled, with 2 ovules in each cell. Styles short, erect and connivent in an oblong or globular mass or in a short ring, or rarely spreading. Capsule globular or depressed, loculicidally dehiscent or separating into 2 valved cocci. Trees or shrubs. Leaves entire, usually distichous on short petioles, but larger and coarser than in most Phyllanthi. *DeCandolle makes this genus only a section of Phyllanthus.*

GLOCHIDION NEILGHERRENSE. (Wight.) A good sized tree glabrous, much branched, young branches flexuose more or less obtusely angled, leaves rather coriaceous elliptic lanceolate more or less oblique and attenuated at the base gradually and bluntly acuminate at the apex, the margins a little waved, dark green above pale beneath, 3-5½ inches long by 1¼-1¾ broad, petioles reddish 3-4 lines long convex on the upper side. Stipules subulate from a broad fleshy base which is adnate to the stem below the petiole and there connate with its fellow, flowers solitary or several (3-4) together in the axils, bracts several very minute in the axils round the pedicels. *Male*, pedicels slender 1-2 lines long slightly hairy, calyx 6-parted imbricate in 2 series the 3 inner being much narrower, 2-3 lines long, segments yellow linear to oblong slightly hairy on the outside, connectives about ⅓ longer than the anther-cell. *Female*, pedicels ½ a line long or obsolete, calyx rather fleshy 1½ lines long somewhat tubular with 4-6 unequal short triangular teeth some of which are often connate, style-column more than twice as long as the calyx, thick truncate of equal thickness in its whole length or scarcely constricted just at the base, and with 4-5 short mammilate points at the apex, minutely puberulous often only near its base within the calyx or quite glabrous, ovary 4-5 celled, fruit depresso-globose umbilicately depressed in the centre about ½ an inch long subglabrous. *Wight Icones* v. 1907, *letter press only.*

A very common tree on the Nilgiris at the higher elevations about Ootacamund, in flower in May; the male flowers are yellow, the female greenish. I am not acquainted with the timber.

Analysis.

1. Portion of a branch and leaf showing the stipule with its subulate free point and its adnate fleshy base.
2. A male flower bud showing the imbricate sepals very slightly hairy on the outside.
3. A male flower.
4. A male flower fully open.
6. Column of stamens removed.
7. A female flower showing the calyx and column of styles.
8. Calyx opened (in this case 6-cleft lobes unequal, but it varies much and is sometimes only 4-cleft.)
9. Column of styles cut vertically, showing the ovary at the base, ovules pendulous, collateral.
10. A 4-celled young fruit cut transversely, cells 2 ovuled.
11. A 5-celled young fruit.
12. A portion of a branch in fruit. (Drawn from living specimens collected at Ootacamund.)

Inver. del.

Humphry Lith.

Glochidion Neilgherrense Wight.

CYCLOSTEMON MACROPHYLLUS. (Nat. order Euphorbiaceæ.)

CYCLOSTEMON. *Blume.*—GEN. CHAR. Diœcious. Calyx deeply 4-5 parted, segments imbricate, petals 0. *Male,* disk concave large naked in the centre or with a minute rudiment of an ovary. Stamens 4-40 inserted round the margin of the disk, filaments free erect, anthers oblong ovoid or ellipsoid introrse or dehiscing down the outer edge, fixed to the filament at the middle of the back, the connective not produced. *Female,* ovary seated on a small disk 2-4 celled, 2-4 sulcate, cells 2 ovuled, ovules collateral pendulous, styles as many as ovary-cells connate at the base, nearly obsolete or filiform, stigmas broad triangular and deeply 2-lobed or narrow and linear. Fruit indehiscent more or less fleshy with 2-4-crustaceous cocci. Seed compressed, with a caruncle, albumen copious fleshy, cotyledons plane foliaceous, radicle very small superior. Trees, leaves alternate simple penniveined entire or toothed coriaceous, stipules deciduous Flowers fascicled from tubercles in the axils of the leaves or from old axils. *Blume Bijd. p.* 597. Sphragidia, *Thw. in Hook. Journ. Bot.* 1855, *p.* 269. *t.* 10. Pyonosandra, *Blume. Mus. Bot. Lugd. Bot.* 2. 191. Dodecastemon, *Hassk. in Bot. Zeit. p.* 803.

DeCandolle divides this genus into 3 Sections as follows :—

1. *Dodecastemon.*—Ovary 3-4 celled, styles 3-4 filiform.
2. *Stenogynium.*—Stamens few, ovary 2-celled, stigma sublinear entire peltately dilated at the apex.
3. *Eucyclostemon.*—Stamens many, ovary 2-celled, stigmas broad 2-lobed.

The following species belongs to the 3rd Section,

CYCLOSTEMON MACROPHYLLUS. (Bl.) A large tree of no great height but with a very thick trunk and branches spreading in every direction, ramuli terete and with the gemmæ tomentose, leaves very coriaceous entire or with a few distant serratures sometimes prominent but often inconspicuous, oblong to lanceolate, acuminate at the apex, 4-12 inches long by 2-4½ inches broad, glabrous in age but when young more or less furnished with a deciduous brown tomentum, petioles 3-4 lines long, veins and veinlets very prominent beneath, stipules small erect lanceolate deciduous, flowers fascicled in the axils or at the old axils (shortly pedicelled or) sessile on the tubercles, densely velvetty outside, males 3-8 together or rarely solitary, females solitary or 2-3 together. *Male,* calyx 4-5 parted 8-9 lines in expansion, segments equal concave rounded, stamens 35-40, rudiment of ovary minute or wanting. *Female,* ovary strigose seated on a disk which is hid in the pubescence, stigmas 2 subsessile each deeply 2-lobed, the segments triangular with a broad 3-cleft apex and narrow base, fruit globose about 1 inch in diameter. *Bl. Bijd. p.* 598. Sphragidia Zeylanica, *Thw. l. c.*

Var. β. sessiliflora.—Flowers sessile.

This tree is very common in the dense moist forests of the Anamallays 2000-4000 *feet elevation, and in Coorg (the water-falls near Mercara),* 4000 *feet, and I have it from other parts of our Western ghats, Travancore, &c., and it is found in Ceylon and Java. All my Indian specimens have the flowers sessile and the leaves occasionally serrated, though often quite entire, and the petioles do not exceed* 4 *lines in length ; in these points only does it differ from the Ceylon tree, so that it cannot, I think, be more than a variety ; the timber is very hard but quite unknown.*

Analysis.

1. Branch of male tree in flower, leaves entire.
2. Serrated leaves.
3. A male flower bud.
4. A male flower, underneath view.
5. A male flower 35 stamens, no rudiment of ovary present (there is sometimes a small one in the centre of the disk.)
6. Anther, front view.
7. Anther, back view.
8. Female flower.
9. The same cut vertically, showing the pendulous ovules.
10. Ovary cut transversely, 2 cells each 2-ovuled.
11. Fruit cut vertically.
12. Seed
13. Seed cut vertically. (Drawn from living specimens.)

Gowinda del. Dalrymple Lith.

Cyclosterum macrophyllus (Bl.)

HEMICYCLIA ELATA. (Nat. order Euphorbiaceæ.)

HEMICYCLIA. *W.A.*--GEN. CHAR. Diœcious. Calyx deeply 4-5-parted, segments imbricate, petals 0. *Male*, stamens 8-25 inserted at or near the margin of a central entire or crenated disk, anthers 2 celled, dehiscing longitudinally, filaments free, rudiment of ovary wanting or very small. *Female*, staminodia 0, disk annular entire or slightly crenate, ovary oblong or globose 1-celled, ovules 2 collateral pendulous from near the apex of the cell, style none or scarcely any, stigma large peltate, fruit (by abortion) a 1-seeded indehiscent drupe, putamen bony or cartilaginous, testa membranaceous, cotyledons large membranaceous, lying in copious albumen, radicle superior very short. Trees or shrubs, leaves alternate shortly petioled simple penniveined entire or toothed, stipules small soon deciduous, flowers small axillary fasciculate, the female often solitary. *W.A. in Edin. New. Philos. Journ. v.* xiv. *p.* 297. Astylis, *Wight Icones*. Anaua, *Miquel*. Periphlexis, *Wall. Cat.* 8022.

This genus scarcely differs from Cyclostemon except in its single-celled ovary.

HEMICYCLIA ELATA. (Bedd.) A lofty straight glabrous tree up to 90-100 feet high, gemmæ minutely puberulous, leaves lanceolate attenuated at both ends more or less oblique at the base ending in a blunt or sharp acumen at the apex, quite entire subcoriaceous, in age glabrous on both sides and shining above, 4-5 inches long by 1½-2 broad, petioles 3-4 lines long. *Male*, flowers 3-5 together in axillary fascicles, peduncles 1-2 lines long tuberculate and furnished with several pubescent bracts, pedicels slender 5-8 lines long, calyx about 2 lines long puberulous on both sides deeply 4-parted, stamens 8-12 the filaments inserted into little ring-like pits round the outer portion of the disk, rudiment of ovary generally absent, sometimes present but very small. *Female*, flowers solitary, peduncle obsolete or only a minute tubercle with a small bract, pedicel slender 9-10 lines long elongating in fruit to nearly 2 inches, calyx as in the male but a little larger, segments soon deciduous, disk annular, ovary oblong, stigma sessile large peltate covering the apex of the ovary like a mushroom, fruit oblong or somewhat obovate 10 lines to 1 inch long, putamen cartilaginous.

This fine tree is very common in the dense moist forests of the Wynaad (2000-4000 feet elevation), and I also have it from the Anamallays and Tinnevelly mountains; the leaves are less coriaceous than in H. venusta, but have exactly the venation and shape of that species, which is a small drooping tree with a different inflorescence. H. sepiaria has much more coriaceous differently shaped leaves, and is scarcely more than a shrub; the timber is strong and much valued for building purposes.

Analysis.

1. Branch of the male tree in flower
2. Branch of the female tree in flower.
3. A male flower bud.
4. A male flower showing 8 stamens (each let into little ring-like pits round the outer part of the disk), no rudiment of ovary.
5. Male flower with 9 stamens and a small rudiment of an ovary.
6. Anther, back view.
7. Anther, front view.
8. Female flower, 4 imbricate deeply parted segments (as in the male), disk annular, ovary oblong, style none, stigma sessile and mushroom like.
9. Ovary cut vertically, 1-celled, 2 collateral ovules pendulous from a little below the apex.
10. Ovary cut vertically, placenta large.
11. Branch in young fruit.
12. Ripe fruit cut open, the sarcocarp fleshy, the putamen cartilaginous.
13. The solitary seed cut vertically, albumen copious, the short superior radicle slightly exserted at the apex, the cotyledons very thin and leafy. (Drawn from specimens in spirits.)

Gownde, del.

Dempsey Lith.

Homicyclia elata (Beddome)

BACCAUREA SAPIDA. (Nat. order Euphorbiaceæ.)

BACCAUREA. *Lour.*—GEN. CHAR. Diœcious or rarely monœcious. Calyx 4-6 rarely 7-8-parted, segments sometimes unequal imbricate in æstivation, petals 0, disk present or wanting or rudimentary. *Male*, stamens 4-10, filaments free inserted round the lobed or disk-like rudiment of an ovary, anthers 2-celled introrse or rarely extrorse. *Female*, ovary 2-5 celled, cells 2-ovuled, stigmas subsessile broad 2-3-lobed or lacerate more or less papillose, fruit indehiscent semicarnose 1-5-celled, cells 1-2-seeded, seed arillate albuminous, cotyledons ovate 3-nerved, radicle short. Trees, leaves alternate opposite or subopposite petioled, bistipulate simple penniveined elliptic entire or subdentate, inflorescence racemed or in spike like panicles generally densely clustered together on the trunk or older boughs, rarely axillary. *Lour Flor. Cochinch. ed. Willd. v. 2 p.* 813. Pierardia, *Roxb. Fl. Ind.* ii. 254. Microsepala, *Miq. Fl. Ind. Bat. Suppl. p.* 444. Hedycarpus, *Miq. Fl. Ind. Bat. vol.* 1 *part* 2 *p.* 359. Adenocrepis, *Bl. Bijd. p.* 579. Caliptroon, *Miq. Fl. Ind. Bat. Supp.* i. 471.

Section PIERARDIA.—Disk suppressed or only rudimentary, stamens 4-10, anthers introrse, ovary 3-2-celled.

BACCAUREA SAPIDA. (Roxb.) A middling sized tree, young parts minutely pubescent, leaves glabrous elliptic with a short blunt acumination entire or sometimes slightly scolloped, 3-8 inches long by 1¼ to 2¾ broad, petioles 6-18 lines long, stipules ovate deciduous. *Male*, flowers very small reddish scarcely 1 line long, spikes puberulous 7-10 inches long generally much crowded on the trunk sometimes almost as dense as a bottle brush, rarely on the branches, paniculate or racemose, the pedicels scarcely ½ a line long crowded in little heads of 3-7 together with or without a short peduncle and with an ovate concave bract at the base, calyx puberulous 4-5 rarely 6-parted, segments equal incurved at the apex, stamens 5-10 (generally 7-8 in the 4-sepaled flowers and 5 in the 5-sepaled ones), rudiment of ovary entire discoid or 2-5 lobed. *Female*, flowers about double as large as the male, in simple puberulous racemes which are 8-12 inches long, pedicels 1-1½ lines long irregularly arranged along the rachis alternate or opposite and distant or rather crowded each with a minute ovate bract at the base, calyx puberulous generally 5-parted sometimes 6-7-8-parted, segments generally very unequal, disk wanting, ovary very hairy ovate truncate at the apex 3-celled, ovules pendulous, stigma sessile 3-lobed, fruit subglobose 1 inch or a little more in diameter, the rind rough but without any hairs marked with 3 prominent ridges running from the apex to the base, bright crimson when ripe, seeds 1-2 only from abortion each enclosed in a succulent acid edible aril.—Pierardia sapida, *Roxb. Fl. Ind.* ii. 254. P. macrostachys et Courtallensis, *Wight's Icones* 1912-13. Baccaurea sapida et Courtallensis, *DC. Prod.* xv. *p.* 459.

This tree is most abundant in all our moist ghat forests from Canara down to S. Travancore up to 3500 feet elevation, and I have copious specimens from all parts; the leaves are alternate and opposite on the same tree and a single spike of flowers will often show all the variations in the perianth and number of stamens, and there can be no doubt that Wight's 2 species belong to the same tree, and are not even varieties. I have not seen Roxburgh's tree, but his description answers very fairly for this species except that the fruit is described as yellow; the fruit (or rather the aril of the seed) is a very pleasant acid, it generally hangs in great profusion from the trunks, the whole trunk appearing as a crimson mass. The tree is also found on the mountains in East Bengal and Birmah, but does not I believe occur in Ceylon; the timber is hard and heavy, but I have never known it in use, but then (as is the case with most of our moist forest trees) it only grows in localities overstocked with many well known timbers, so that it never receives the chance of a trial. In Birmah it is used, I believe, for wheel-axles. In South Canara the tree is called Koli kukee (Canarese.)

Analysis.

1. Male inflorescence.
2. Portion of the panicle magnified, the pedicels sometimes sessile in a crowded head (racemose), sometimes with a common peduncle (paniculate).
3. A male flower bud.
4. A male flower open, 4 imbricate sepals, 7 stamens, disk none or almost obsolete, rudiment of ovary 4-lobed.
5. A male flower showing 5 sepals and 5 stamens, rudiment of ovary sub 5-lobed.
6. Anthers, front and back view.
7. The bract present at the base of each of the heads of male flowers.
8. Female inflorescence.
9. Female flowers, sepals imbricate often very unequal.
10. A 6-parted calyx.
11. A 7-parted calyx.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 3 cells each 2-ovuled.
14. Portion of a female raceme magnified. (All drawn from fresh specimens.)

Govindo del. Dampsey Lith.

Baccaurea sapida. (Roxb.)

TREWIA NUDIFLORA. (Nat. order Euphorbiaceæ.)

TREWIA. *Linn.*—GEN. CHAR. Diæcious. Petals and disk absent both in the male and female. *Male*, calyx 3-4 parted, segments equal valvate. Stamens numerous (about 80) central inserted on a depressed hemispherical receptacle, filaments free, anthers basifixed oblong 2-celled dehiscing longitudinally extrorse and introrse, connective not produced; no rudiment of an ovary. *Female*, calyx sheathing unequally 3-4 toothed at the apex soon deciduous, ovary 3-4 celled, cells 1-ovuled, ovules pendulous, styles 3-4 (equalling the number of the ovary cells) slightly combined at the base, stigmas elongate simple very papillose, fruit a fleshy depresso-globose drupe with 3-4 hard cocci; seed exarillate, albumen copious, cotyledons foliaceous, radicle superior. A tree, leaves opposite broad ovate or cordate membranaceous entire glandless or furnished with 2 rarely 4 glands about the base, long petioled, 3-5 nerved, racemes axillary, flowers small crowded in the male, few in the female.—Tetragastris, *Gærtn. fruct.* 2 *p.* 130. *t.* 109. *f.* 5.

TREWIA NUDIFLORA. (Linn.) A middling sized tree, young branches angled, young parts pubescent, stipules linear subulate soon caducous, leaves subglabrous in age, cordate rounded or suddenly cuneate at the base with a more or less tapering acumen at the apex, finely venose, 4-7 inches long by 3-5½ broad, petioles 1½-3 inches long. *Male*, racemes pendulous many flowered as long as or exceeding the leaf slightly stellato-puberulous, flowers about 3 lines long generally 3 together with a small ovate bract at the base, pedicels about 1 line long, flower-buds globose. *Female*, racemes few-flowered, the flowers including the styles 12-15 lines long; drupe hoary 12-15 lines in diameter, all the rest as in the generic character. *Roxb. Fl. Ind.* iii. 837;—*Wight's Icones* 1870-71. Tetragastris ossea, *Gærtn.* Trewia macrophylla, *Roth.* Rottlera Indica, *Willd.* Rottlera Hoperiana, *Blume.* Trewia macrostachya, *Klotzsch.*

A common tree throughout the plains of this Presidency, also in Bengal, Ceylon, Java and Sumatra; the timber is soft and of no value; in South Canara the tree is called Kat Koombla (Canarese), and in Bombay Pitari.

Analysis.

1. Branch of a male tree in flower (life size.)
2. Portion of a male raceme highly magnified.
3. A male flower bud just opening, calyx valvate.
4. A 3-sepaled male flower, no disk, no rudiment of ovary.
5. A 4-sepaled male flower.
6. Anthers (front and back view) basifixed.
7. A branch of female tree in flower (life size.)
8. Female flower, 3 styles and stigmas, this belongs to a 3-celled ovary; when the ovary is 4-celled there are 4 styles, (the calyx fallen off leaving only an undulated ring ?)
9. Female flower showing the calyx.
10. Portions of the stigma highly magnified.
11. Ovary cut vertically, ovules pendulous.
12. A 3-celled ovary cut transversely.
13. A 4-celled ovary cut transversely, (the calyx has fallen away from all my specimens of the female flower. No. 9 is copied from Wight's drawing, the rest from dried specimens.)

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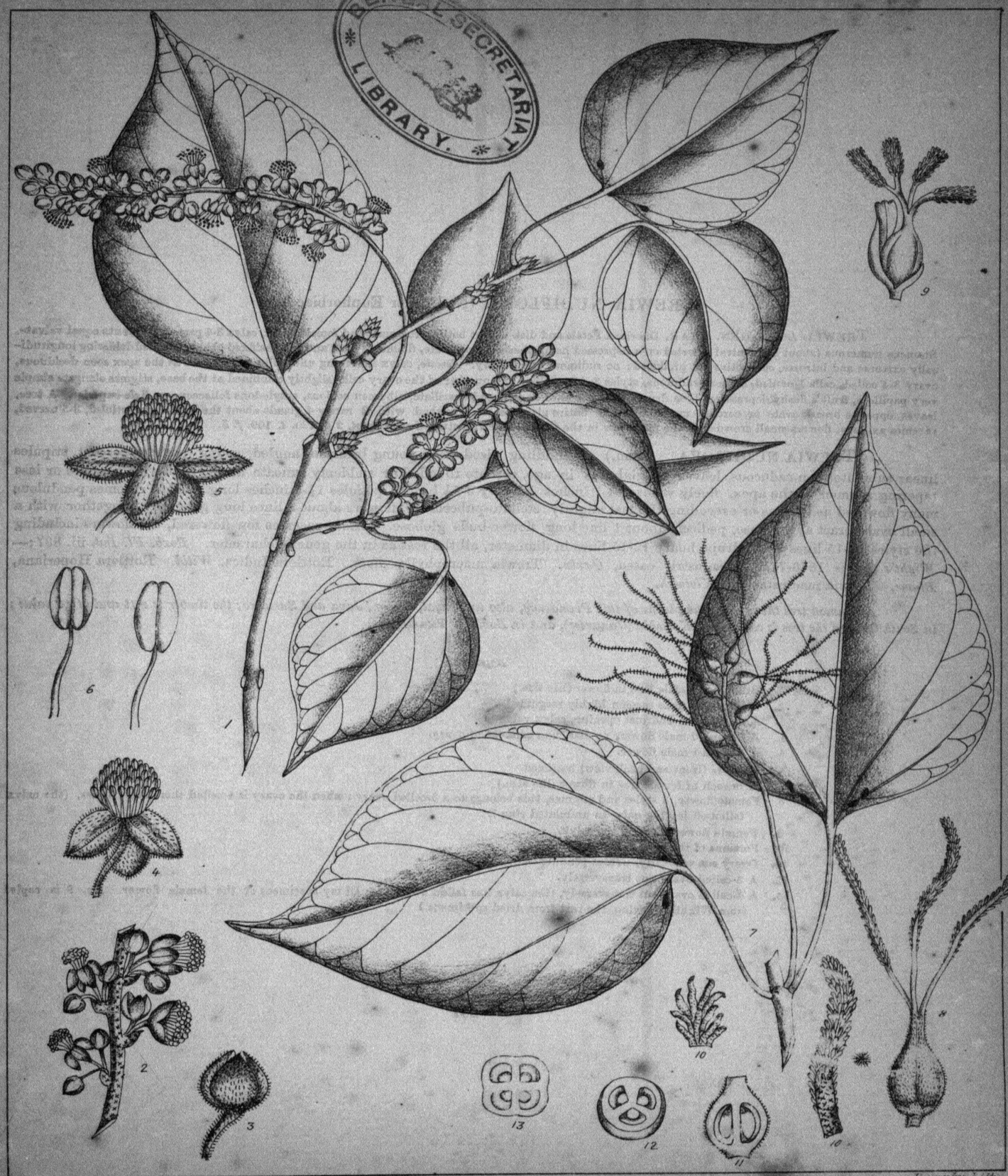


Govindo del.

Trewrapley Lith.

Trewia nudiflora, Linn

PODADENIA THWAITESII. (Nat. order Euphorbiaceæ.)

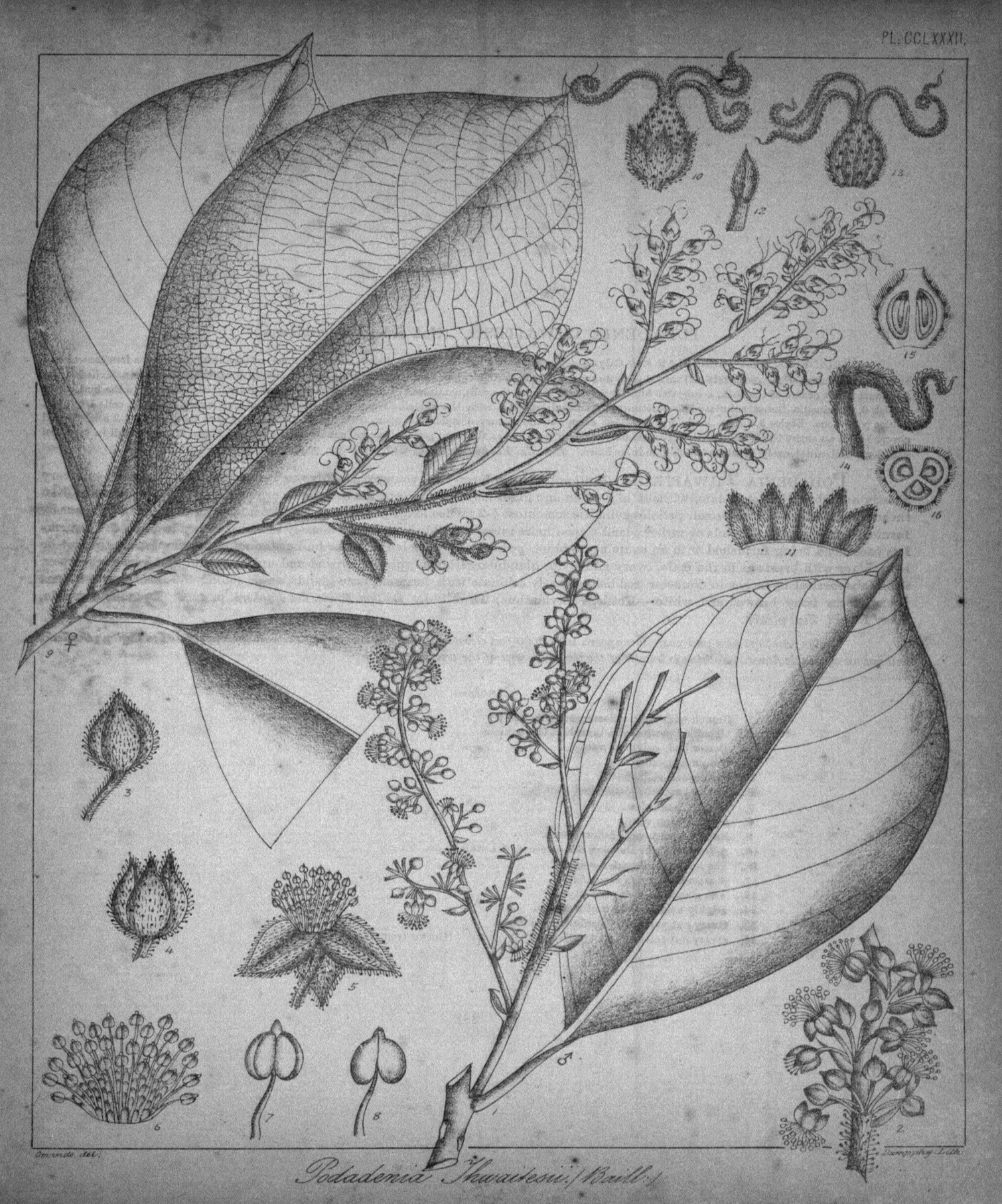
PODADENIA. *Thw.*—GEN.CHAR.*Male.* Calyx 3-4-parted valvate in bud, petals 0, disk 0, stamens numerous (about 30), filaments free central and seated on a hemispherical receptacle and mixed with numerous glands, anthers globoso-oblong dehiscing longitudinally down the outer edge, attached to the filaments at the centre of the back, connective bluntly apiculate beyond the cells, rudiment of ovary 0. *Female*, calyx 5-4-parted imbricate in the bud, petals 0, disk 0, staminodia linear subulate 1-5 sometimes present, alternating with the calycine-segments or altogether absent, ovary 3-celled, cells 1 ovuled, ovules pendulous. Styles 3 simple long very papillose except at the recurved apiculate apex, fruit fleshy indehiscent 3-or by abortion 1-2 seeded, seed covered with an entire thick fleshy aril, ecarunculate. A large tree, leaves alternate petioled entire penniveined without glands, flowers small in terminal panicles which are densely furnished with glandular hairs. *Thw. En. Pl. Zey. p.* 273;—*DC. Prod.* xv. *p.* 791.

PODADENIA THWAITESII. (Baillon.) A very large tree, young parts fulvo-or rufo-tomentose, leaves obovate very shortly and abruptly acuminate, without glands, in age glabrous above except the costa and primary veins, pilose beneath, 5-10 inches long by 2½-5 inches broad, petioles cylindric tomentose ¾-2 inches long, panicles tomentose and with the calyx, &c. densely furnished with stipitate glands or rather gland-tipped hairs; flowers reddish, the male densely fascicled in heads along the branchlets each head being furnished with an ovate acute bract, pedicels 2-3 lines long, flower bud acuminate; female flowers solitary or subsolitary with bracts as in the male, ovary and styles glandular, stigmas spirally twisted and apiculate and glabrous at the apex, fruit subspherical 1½ inches in diameter reddish, densely echinate with large stipitate glands, seed oblong 8-9 lines long 4-5 lines broad testa bony brown, aril white.—Rottlera (Stylanthus) Thwaitesii, *Baillon Etude. des Euphorb. p.* 426. Podadenia sapida, *Thw. En. Pl. Zey. p.* 273.

Ceylon, Ambagamwa and near Ratnapoora 1000-2000 *feet elevation; this fine tree is, as far as we know, confined to Ceylon; the fleshy aril has an agreeable flavor. Nothing is known of the timber or uses of the tree.*

Analysis.

1. Branch with male inflorescence (life size.)
2. Magnified portion of a branch of the panicle.
3. Flower bud, calyx valvate.
4. The same opening.
5. Full flower, stamens 30.
6. Stamens and the intermixed glands.
7. Anther, front view.
8. Anther, back view.
9. Branch with female inflorescence.
10. A female flower showing the presence of 1 staminode.
11. The imbricate 5-parted calyx.
12. A staminode much magnified.
13. The glandular ovary and styles.
14. Highly magnified view of a stigma.
15. Ovary cut vertically, pendulous ovules.
16. Ovary cut transversely 3-celled, cells 1 ovuled. (Drawn from dried specimens.)



Podadenia Thwaitesii (Baill.)

CROTON SCABIOSUM. (Nat. order Euphorbiaceæ.)

CROTON. *Linn.*—GEN. CHAR. Monœcious or rarely diœcious. *Male*, calyx 5 (rarely 4-6) parted valvate or imbricate, petals as many as the calyx-lobes and alternate with them, or sometimes obsolete or more or less rudimentary imbricate in æstivation, disk dilated into 5 glands alternate with the petals, stamens central usually 10-20 (rarely fewer or very numerous), filaments free basifixed, anthers adnate 2-celled, rudiment of ovary 0. *Female*, calyx as in the male, petals more or less rudimentary or none, disk as in the male or often less developed; ovary 3-(rarely 2-4)-celled, cells 1-ovuled, ovules pendulous, styles 3 (rarely 2-4) 2-cleft or branched. Fruit a capsule dividing into 2 valved cocci, albumen present, cotyledons ovate equalling the radicle. Trees, shrubs or herbs, leaves alternate entire or divided petioled penniveined or 3-5-nerved, racemes or spikes terminal usually with the male flowers numerous above and a few female flowers below.—Tridesmis, *Lour.* Astrogyne, *Benth.* Dacarinium, Drepadenium and Heptalla, *Rafin.* Hendecandra, *Eschw.* Pentalostigma, *Mart.* Argyrodendron, Astræa, Barhamia, Brachystachys, Cleodora, Codonocalyx, Crotonanthus, Cyclostigma, Engelmania, Eutropia, Geiseleria, Lasiogyne, Leucadenia, Medea, Ocalia, Pilinophyton, Podocalyx, Podostachys, Tiglium, Timandra, *Klotzch.* Geiseleria, *Mtq.* Angelandra, *Endl.* Gymnamblosis, *Torr.* Calyptriopetalum, *Hassk.* Klotzschiophyton, *Baill.* Aubertia and Monguia, *Chapel.* Argyra, *Noronha.* Anisophyllum and Furcaria, *Boiv.* Myriogomphus, *Fr. Diedrichs.*

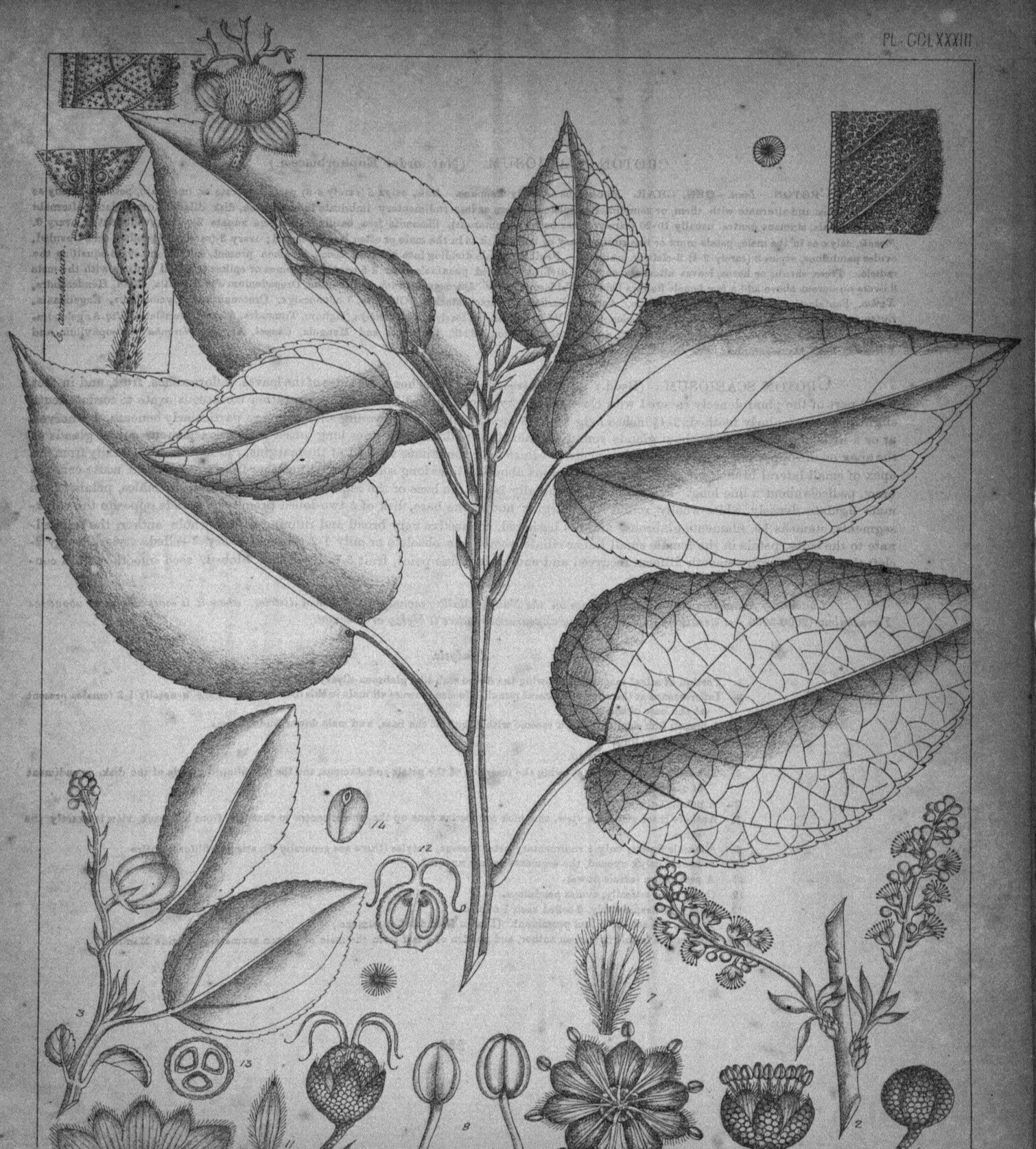
CROTON SCABIOSUM. (Bedd.) A small tree, young branches, both sides of the leaves, inflorescence, fruit, and in fact every part of the plant densely covered with close-set silvery smooth scab-like scales, leaves rather coriaceous ovate to cordate acute slightly and irregularly toothed, 2-4½ inches long by 1¼-3 broad, golden when young silvery in age particularly beneath, 3-5 nerved at or a little above the base without glands round the margins, petioles 8-24 lines long often with 2 conspicuous round glands at the apex on the upper side, stipules lanceolate acute 3-4 lines long sometimes toothed at the margins, racemes short generally from the apex of small lateral branches. *Male*, flowers numerous about 2½ lines long solitary or 2-3 together from a small ovate acute concave bract, pedicels about a line long. *Female*, flowers generally 1-2 at the base of the raceme a little longer than the males, petals of the male ligulate densely white-woolly round the margins and at the base, disk of 5 two-lobed prominent glands opposite the calyx-segments, stamens 10, filaments glabrous, anthers basifixed, connective very broad and running up the whole anther, the cells adnate to the sides, petals in the female small linear ciliate sometimes obsolete or only 1-2 present, ovary 3-celled, styles deeply 2-cleft the divisions entire smooth filiform recurved and ending in a fine point, fruit 5-6 lines long 3-lobed, seed smooth with a conspicuous scar.

I have only found this very distinct species on the Nullay Mallay mountains, Kurnool district, where it is most abundant about the Yerrachalma (2000-3000 *feet elevation*); *its very silvery appearance renders it highly ornamental.*

Analysis.

1. Portion of a leaf magnified, showing the dense scab-like glabrous silvery scales.
2. Inflorescence at the apex of 2 lateral ramuli, life size (flowers all male in this instance; there are generally 1-2 females present at the base of the raceme.)
3. A branch (life size) showing a raceme with 1 fruit at the base, and male flower buds at apex.
4. A male flower bud.
5. A male flower, stamens 10.
6. The male flower opened, showing the insertion of the petals and stamens, and the 5 two-lobed glands of the disk, no rudiment of ovary.
7. A petal.
8. Anthers front and back view, the thick connective runs up the entire centre so that the front and back view is exactly the same.
9. A female flower, only 1 rudimentary petal present, 2 styles (there are generally 3), stigmas filiform entire.
10. A female calyx opened, the segments rather unequal.
11. A petal from female flower.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, 3-celled each 1-ovuled.
14. A seed, the scar or hilum prominent. (Drawn from dried specimens.)

Fig. *A.* represents a female flower, an anther, and portion of a leaf from the male of Croton aromaticum. (vide Manual.)



Croton scabriosum. (Bedd.)

CHŒTOCARPUS CASTANOCARPUS. (Nat. order Euphorbiaceæ.)

CHŒTOCARPUS. *Thw.*—GEN. CHAR. Diœcious. Calyx in both sexes 4-parted imbricate in æstivation, petals 0, disk irregularly lobed. *Male,* stamens 8-16 joined below into a central pilose column round the rudimentary ovary, filaments free above, the exterior alternate with the sepals and lobes of the disk, anthers introrse sub-basifixed, 2-celled dehiscing longitudinally, rudiment of ovary entire or 2-3 fid. *Female,* ovary surrounded by the lobed disk 3-celled, cells 1-ovuled, ovules pendulous, styles 3 bifid to nearly the base fimbriate, fruit a capsule echinate or warty dehiscing loculicidally with hard valves, seed ovate shining pendulous furnished with a large 2-lobed fleshy caruncle, cotyledons plano foliaceous in copious albumen, radicle very short superior. Trees, leaves alternate bistipulate petioled penniveined coriaceous entire without glands, flowers small fascicled in the axils, shortly pedicelled or subsessile furnished with scale-like bracts. *Thw. in Hook. Lond. Journ. of Bot.* vi. *p.* 300.

CHŒTOCARPUS CASTANOCARPUS. (Roxb.) A tree variable in size, sometimes large, sometimes middling sized, or small and much branched; young parts minutely pubescent, leaves oblong or ovate-oblong to broad lanceolate with a long acumination, entire glabrous 3 to 9 inches long by 1½ to 3 inches broad; petioles 3-4 lines long, stipules falcate, flowers axillary slightly pubescent, the male more crowded about 2 lines long, stamens 8, the female slightly larger, bracts pubescent scale-like, fruit subspherical as large as a nutmeg echinate with rigid inoffensive fragile yellowish-brown bristles, caruncle crimson.—Adelia castanicarpa, *Roxb. Fl. Ind.* iii. *p.* 848. Chœtocarpus, *Thw. En. Pl. Zey. p.* 275.

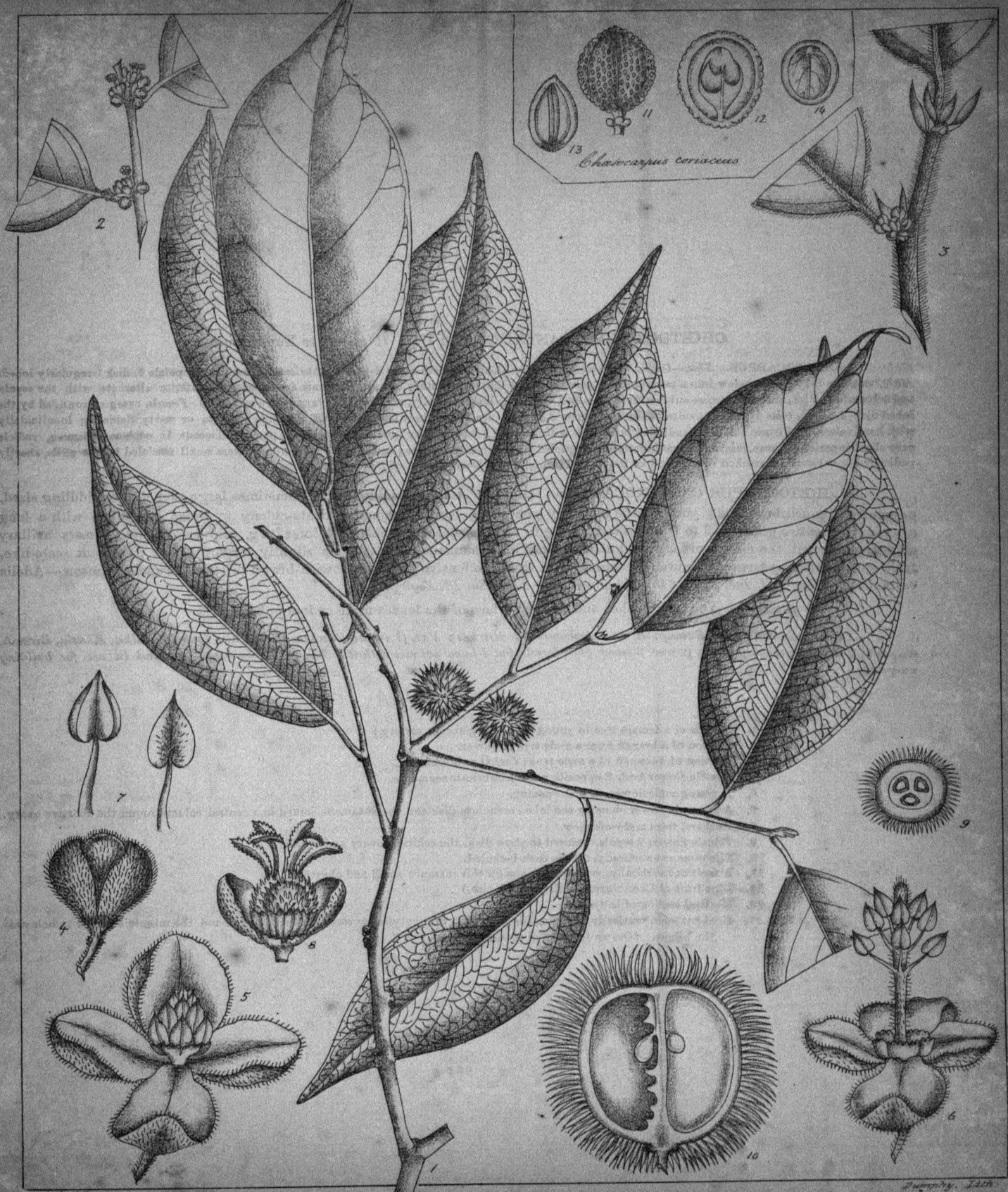
Var. β. pubescens.—Young branches and under surface of the leaves more or less pubescent.

Ceylon, common in the Ratnapura and Ambagamwa districts; Var. β in the Pasdoon Corle; also found in Silhet, Khasia, Birmah, &c., so that it very probably occurs in our Western ghat forests, but I have not met with it. The timber is very hard and in use for building purposes.

Analysis.

1. Branch of a female tree in young fruit (the glabrous variety.)
2. Portion of a branch from a male tree in flower.
3. Portion of a branch of a male tree (Var. β pubescens.)
4. A male flower bud, 2 opposite pair of imbricate segments.
5. A young male flower on first opening.
6. A full male flower showing the lobed crenulate disk and the 8 stamens joined in a central column round the abortive ovary.
7. Anthers, front and back view.
8. Female flower, 2 sepals removed to show disk, the echinate ovary and styles.
9. The same cut vertically, 3 cells each 1-ovuled.
10. A fruit cut vertically, seeds pendulous (in this instance small and aborting.)
11. Ripe fruit of Chœtocarpus coriaceus (life size,)
12. Vertical section of the same.

13, 14. Seed cut open vertically, showing the foliaceous thin cotyledons seated in the albumen and the minute superior radicle near the hilum. (Drawn from dried specimens.)



Chætocarpus castanocarpus. Roxb.

GIVOTIA ROTTLERIFORMIS. (Nat. order Euphorbiaceæ.)

GIVOTIA. *Griff.*—GEN. CHAR. Diœcious. Calyx 5-parted imbricate, petals 5 alternate with the calyx-segments. *Male*, disk large fleshy 5-lobed the lobes alternate with the petals, stamens central 16-15 (10 inner long, 6 outer short) more or less united into a very short column at the base but some quite free, filaments free above and hairy on their lower half, anthers 2-celled dehiscing longitudinally fixed by the centre of the back, no rudiment of ovary. *Female*, disk annular sub 5-lobed, ovary 2-3-celled, cells 1-ovuled, ovules pendulous, styles 2-3 each 2-cleft, fruit a drupe with a hard 1-seeded nut, seed exarillate, albumen copious, cotyledons broad foliaceous palmatinerved, radicle short superior. A tree, leaves alternate cordate long-petioled palmatinerved and with all the young parts densely stellato-pubescent; flowers in long terminal panicles. *Griff. Pl. Hort. Calc.* 14. *(ex Endl.)* Govania, *Wall. Cat.* 7851.

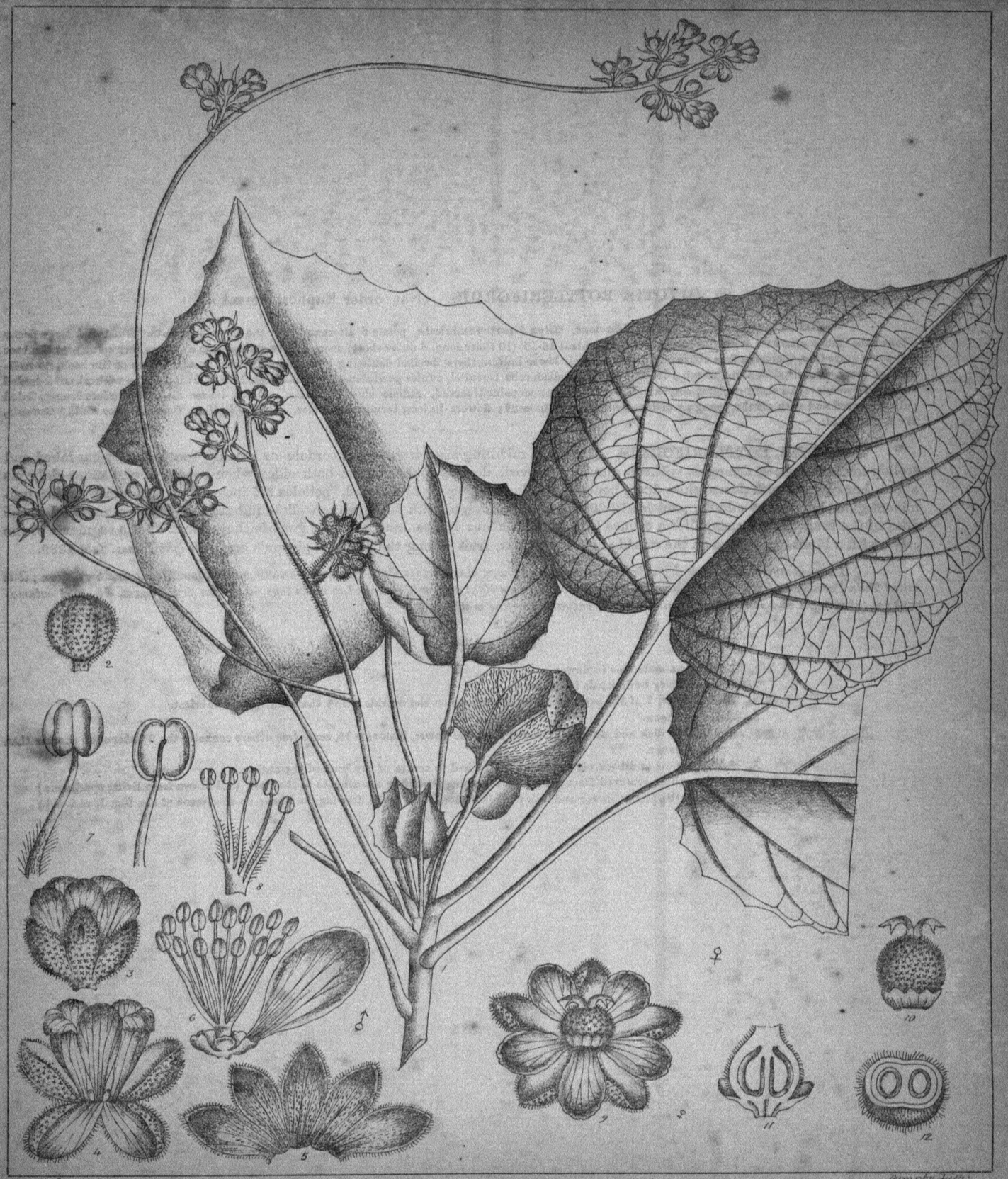
GIVOTIA ROTTLERIFORMIS. (Griff.) A middling sized tree, leaves cordate or broadly ovate, somewhat lobed and scollop-toothed acute at the apex, without glands, 7-nerved, densely pubescent on both sides when young, in age more glabrous above, but covered with dense white down beneath, 4-6 inches long by 3½-6 broad, petioles 3-5 inches long sometimes with 2 prominent glands about the middle, panicles 10-20 inches long covered with dense white stellate pubescence, flowers congested at the apex of the branchlets, bracts filiform 3 lines long, flowers about 4 lines long as in the generic character, 2 of the segments of the calyx with a blunt appendage on the outside below the apex, fruit oblong the size of a pigeon's egg. *Wight Icones. tab.* 1889.

A very common tree in all dry subalpine forests on the west side of this Presidency, also on our eastern mountains and in Ceylon; it is called Tella Poonkee in Teligu, Vendàle in Tamil; the wood is very light and soft and used to make toys, imitation fruit, boxes, &c., and catamarans; it takes paint very well; the seed yields an oil valuable for fine machinery.

Analysis.

1. Branch of a male tree in flower.
2. A male flower bud, sepals imbricate.
3, 4. Male flowers, 2 of the sepals with an appendage on the outside below the apex, petals imbricate.
5. Calyx cut open.
6. The 5-lobed disk and stamens removed from the flower, filaments 16, some free others connate, the 6 outer ones shorter than the 10 inner.
7. Anthers front and back view, filaments attached to centre of the back of the anther.
8. A few anthers removed from the column to show that they are connate at the base. (All drawn from living specimens.)

Fig 9—12. Views of the female flower and ovary copied from Dr. Wight's drawing (as I have no specimens of the female at hand.)



Gonindo, del.

Murphy Lith.

Givotia rottleriformis. (Griff.)

APOROSA LINDLEYANA. (Nat. order Euphorbiaceæ.)

APOROSA. *Blume.*—GEN. CHAR. Diœcious, petals and disk 0 in both sexes. *Male*, calyx 3-6 generally 4-parted imbricate, stamens 2-5, rudiment of an ovary minute or absent, filaments free, anther cells distinct globular dehiscing longitudinally. *Female*, calyx 4-6-parted imbricate, ovary 2-3-celled with 2 pendulous ovules in each cell, styles equal in number to cells of ovary very shortly united short recurved retuse or 2-lobed, drupes 2-3-celled or often only 1-celled by abortion, with a single seed in each cell. Trees or shrubs, leaves alternate petioled bistipulate generally lanceolato-ovate, penniveined entire or toothed, the male inflorescence in catkins, the female in axillary clusters or short spikes. *Bl. Bijdr. p.* 514. Leiocarpus, *Bl. l. c.* 581. Lepidostachys, *Lindley*. Scepa, *Lind.* Tetractinostigma, *Hassk.*

APOROSA LINDLEYANA. (Wight.) A small or middling sized tree, gemmæ puberulous, branches glabrous, leaves glabrous lanceolato-ovate acute or obtuse at the base and apex, entire, 4-6 inches long by 1½-2¼ broad, petioles 3-4 lines long. Stipules ovate-oblong obtuse erect very membranaceous soon caducous a little pilose on the outside, 5 lines long by 2-3 lines broad. *Male*, catkins sessile often forked about 1 inch long solitary or 2-3 together at the old axils or axillary, bracts broader than long ciliate fimbriato-denticulate, calyx 4-6 parted, segments obovate or rhomboid ciliate about ½ a line long, anthers 2-5 more or less exserted. *Female*, spikes solitary or twin, about 3 lines long densely bracteate, bracts broad ovate ciliate, flowers on pedicels ½ to 1 line long, calyx generally 5-parted, segments broad ovate very small, ovary ovoid acute fulvo-pilose 2-3-celled, stigmas short bifid papillose, ovules pendulous from an enlarged placenta which reaches more than ½ down the cells and which has a projection ½ covering the ovule, fruit subglobose shortly apiculate ½ an inch long subsessile or on a pedicel 1-2 lines long.—Scepa Lindleyana, *Wight Icones tab.* 361.

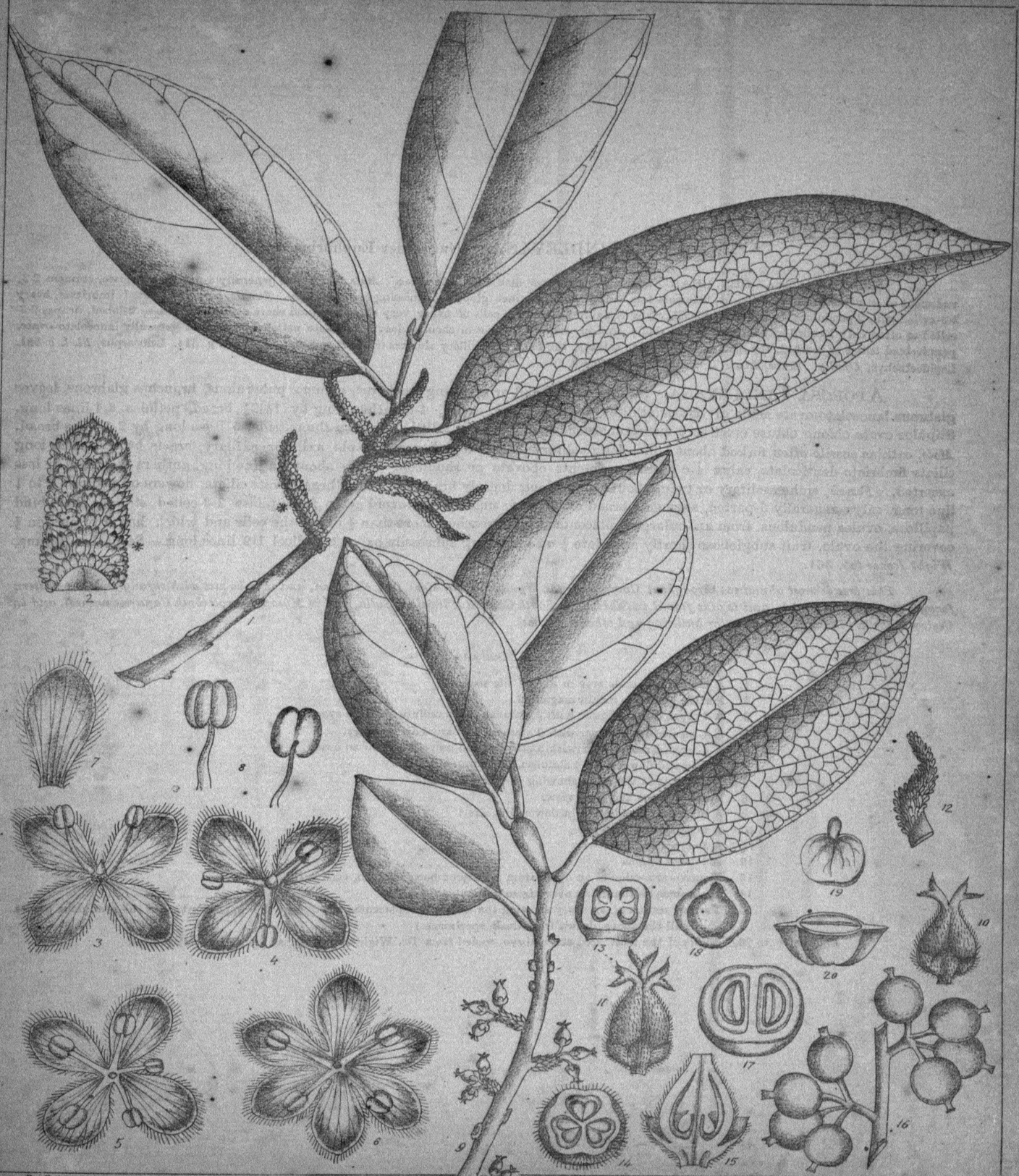
This tree is most abundant throughout Coorg and the Wynaad up to 4000 feet elevation, and is to be met with throughout our western forests, Bombay and Ceylon, and is also found in Sikkim; in South Canara it is called Sulla, and in Mysore Surroli (both Canarese names), and in Ceylon Kabella; the wood is in use for building and other purposes.

Analysis

1. A branch of a male tree in flower (life size)
2. Portion of a male catkin magnified.
3. A 4-sepaled male flower with 2 stamens and a minute abortive ovary.
4. A 4-sepaled male flower with 3 stamens and an abortive ovary.
5. A 4-sepaled male flower with 5 stamens and no rudiment of an ovary.
6. A 6-sepaled flower with 4 stamens, no rudiment of ovary.
7. A segment of the calyx showing the margin ciliate.
8. Anthers, front and back view.
9. A branch of female tree in flower (life size.)
10. A 2-styled female flower.
11. A 3-styled female flower.
12. A lobe of stigma.
13. Transverse section of an ovary from a 2-styled flower, 2 cells, each with 2 ovules.
14. Transverse section of an ovary from a 3-styled flower.
15. Vertical section of an ovary showing the very large placentas lobed over the upper portion of the pendulous ovules.

(All the above drawn from fresh specimens.)

Figures 16 to 20. Views of the fruit, seed and embryo, copied from Dr. Wight's drawing, as I have no fruit at hand.



Fonvielle del.

Dumphy Sculp.

Aporosa Lindleyana (Wight)

MACARANGA TOMENTOSA (Nat. order Euphorbiaceæ.)

MACARANGA *Thouars.*—GEN. CHAR Diœcious, petals and disk 0. *Male*, calyx valvate, stamens 2-8 or numerous (but less than in Mallotus), rarely only 1 central, seated on the subconvex receptacle and irregularly verticellate, anthers 3-4-celled fixed by the back with the connective incomplete and shorter than the cells, no rudiment of an ovary. *Female*, calyx imbricate, ovary 1-6-celled cells 1-ovuled, fruit a capsule, seed not carunculate albuminous, cotyledons broad much longer than the radicle. Trees, leaves alternate peltate and palmatinerved, or lanceolate and penniveined, inflorescence very various glomerate or fasciculate or in axillary spikes, racemes or panicles. *Pet. Thouars Gen. Madagas p.* 26 *t.* 88;—*DC. Prod.* xv. *p.* 987. Pachystemon, *Bl. Bijdr. p.* 626. Mappa, *Adr. Juss.* Adisca, *Zolling.* Mecostylis, *Kurz.* Panhopia, *Noronha.* Claoxyli sp., *Wight.* Osyris sp., *Roxb.*

Section EUMACARANGA.—Anthers 4-valved, ovary 1-celled.

MACARANGA TOMENTOSA. (Wight.) A small or middling sized tree, the young parts more or less densely stellato-tomentose, leaves orbicular with a longish acumination, subentire or with minute teeth at the excurrent veins, peltate, scarcely coriaceous, in age subglabrous above except the costa and primary veins which are mealy-puberulous, more or less tomentose or pubescent beneath and there furnished with numerous minute waxy dot-like glands, 6-8 inches long by nearly as broad, palmately 9-nerved at the insertion of the petiole, pinnately veined above, veinlets parallel very regular and prominent, petiole 2-5 inches long terete, stipules large triangularo-ovate acuminate tomentose. *Male*, panicles axillary and from the old axils from a little shorter to nearly as long as the leaves, much branched, flowers in interrupted sessile heads, bracts 2-2½ lines long tomentoso-ovate to obovate or 3-lobed dentate, venose many flowered, calyx deeply 3-lobed, lobes cuneate obovate hairy on the outside, filaments 2 or 3 free about as long as the calyx. *Female*, panicles much shorter than in the male and less compound, bracts as in the male but rather smaller 1-2 flowered, pedicels 2-3 lines long; calyx subentire, ovary subglobose, much incurved, stigma subovoid obtuse lateral, capsule globose scarcely 3 lines in diameter densely covered with waxy dot-like glands, seed globose subscrobiculate, testa crustaceous. *Wight Icones tab.* 1949. *fig.* i. *& fig* ii. *No.* 9;—*DC. Prod.* xv. *p.* 1010.

A very common tree in all our western forests and in Bombay and Ceylon, generally affecting old clearings of forest and often planted for shade by coffee planters; called Vatte Kanni in Tamil, Upligi and Upalkai in Canarese (S. Canara), Chenthakanni in Mysore (Canarese), Chanda in the Bombay Presidency, and Kanda in Ceylon; a gum exudes from the tree which is used medicinally by the natives and for taking impressions; the timber is soft and useless, the tree is of very rapid growth.

Analysis.

1. A branch of male tree in flower.
2. The flowers and bracts.
3. A 3-lobed bract.
4. A flower with 2 stamens, calyx 3-lobed
5. A flower with 3 stamens, calyx 3-lobed.
6. The 4-celled anther.
7. A lobe of the calyx. (All drawn from living specimens.)
8. Portion of a branch of a female tree in fruit.
9. A bract from the female panicle.
10. A female flower rather advanced, stigma lateral, ovary and stigma covered with glands.
11. The same cut vertically showing the single cell and solitary erect ovule. (Drawn from dried specimens.)

Fig. *A.* Dissections of M. Indica. (See Manual.)

Macaranga tomentosa (Wight)

DAPHNIPHYLLUM ROXBURGHII. (Nat. order Euphorbiaceæ ?)

DAPHNIPHYLLUM. *Blume.*—GEN. CHAR Diœcious. Calyx very small 3-8 parted, petals 0 or rudimentary. *Male*, stamens 5-12, anthers 2-celled dehiscing longitudinally ovate thick on very short filaments radiating from a central disk. *Female*, ovary ovoid incompletely 2-celled with 2 pendulous ovules in each cell. Styles 2 united at the base shortly recurved undivided, stigmas papillose, berry ovoid indehiscent, seed solitary, embryo minute at the apex of a thick fleshy albumen, radicle superior. Trees or shrubs, leaves alternate on long petioles entire coriaceous, flowers in axillary or lateral racemes. *Blume.* Goughia, *Wight Icones* 1879. Gyrandra, *Wall.*

DAPHNIPHYLLUM ROXBURGHII. (Baillon.) A good sized glabrous tree, leaves oblong or subobovate generally obtuse or retuse with a small mucro, more rarely acute or acuminate very coriaceous, 3 to 4½ inches long by 1½-2 broad, dark shining green above glaucous beneath, petioles 1-1½ inches long channelled above, racemes axillary from a little shorter to a little longer than the petioles. *Male*, calyx minute and soon deciduous but exceeding the filaments, stamens about 8. *Female*, calyx 5-6 parted, the segments very unequal, generally 2-3 nearly equalling the ovary, the others very small, rudimentary, petals 2-5 or altogether wanting, irregular and unequal opposite or alternate with the segments of the calyx, styles short spreading, ovary glaucous, drupe oblong about ½ an inch long crowned with the remains of the styles, nut hard and rugged. *Baillon. Euph.* 565. Goughia Neilgherrense, *Wight Icones tab.* 1878-79.

A very common tree on the Nilgiris, Pulneys, and Anamallays, and other mountains on the west side of the Presidency, and in Ceylon at elevations from 4000 *feet upwards, also indigenous in Hong-kong, Loochoo, Corea and in Japan ; called Nir-chappay by the Burghers on the Nilgiris ; the wood is very inferior but makes excellent fuel. Its foliage makes it highly ornamental for shrubberies, &c.*

Analysis.

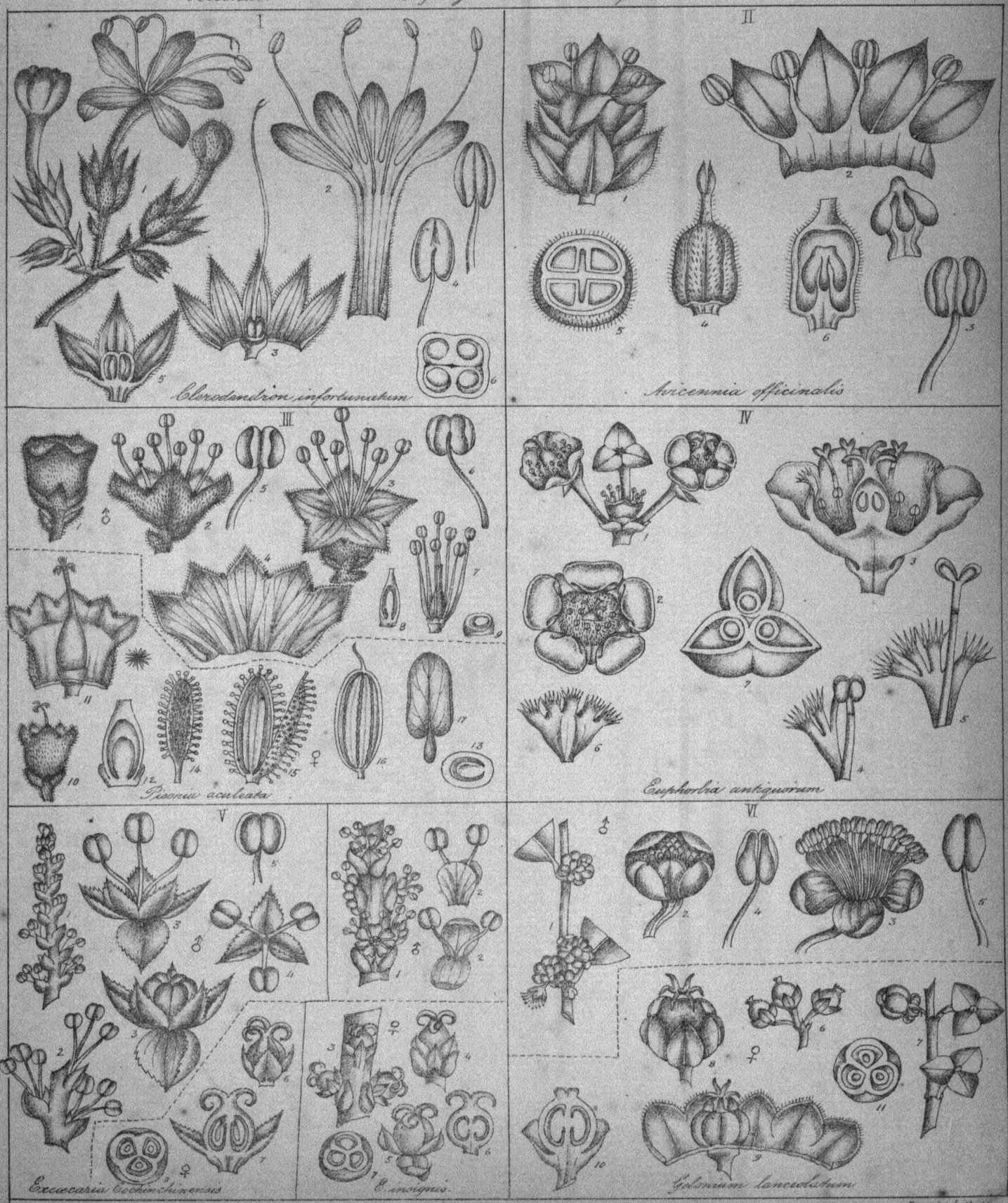
1. Branch of female tree in flower and fruit.
2. A female flower.
3. A 6-parted calyx opened, no petals present.
4. A 5-parted calyx opened, showing the presence of 5 rudimentary petals.
5. Ovary cut vertically, ovules pendulous.
6. Ovary cut transversely, incompletely 2-celled, the cells 2-ovuled.
7. Ripe fruit cut vertically.
8. The hard putamen or nut.
9. The embryo.

10, 11, 12. Branch of male tree and male flowers, copied from Dr. Wight's drawing. Nos. 1 to 9 drawn from living specimens collected on the Nilgiris.

Gounds del. Dimmock Lith.

Daphniphyllum Roxburghii (Baillon)

Verbenaceæ *Nyctagineæ* *Euphorbiaceæ*



Bamphy Lith.

MALLOTUS PHILIPPINENSIS. (Nat. order Euphorbiaceæ.)

MALLOTUS, *Lour.*—GEN. CHAR. Diœcious or rarely monœcious, calyx 2-5 cleft, valvate, petals none, disk none or very rarely present in the female flower. *Male*, stamens numerous central free or shortly united at the base, anthers 2-celled, rudiment of ovary none, or rarely a minute one present. *Female*, ovary 3-(or rarely 2-5-) celled, cells 1-ovuled, styles as many as the ovary cells, simple recurved usually densely plumose on the inner side, capsule dividing into 3 (or rarely 2-5) cocci, seed ecarunculate, albumen copious, cotyledons broad, radicle short. Trees or shrubs, leaves alternate or opposite 3-5 nerved at the base bistipulate entire toothed or lobed, usually with 2 depressed glands at the base, flowers in racemes or spikes terminal or very rarely axillary. *Lour. Fl. Cochinch. p.* 781. Rottlera, *Roxb.* Echinus, *Lour.* Elateriospermum, *Blume.* Melanolepis, *Reichenb.* Boutonia, *Boj.* Cordemoya, *Baill.* Adisca, *Bl.* Echinocroton, *Mueller.* Hancea, *Seem.* Axenfeldia, *Baill.* Plagianthera, *Reichenb.*

MALLOTUS PHILIPPINENSIS. (Lam.) A middling sized tree, young branches minutely hoary tomentose, leaves oblongo-elliptic to ovate obtuse or with a long acumination, 3·6 inches long entire rather coriaceous, glabrous above except when young minutely hoary tomentose or often glaucous beneath and there furnished with minute red glands 3-nerved at the base, furnished at the base on the upper side with 2 depressed glands, petioles ½-2 inches long terminal at the apex, spikes axillary and terminal dense and paniculate in the male, generally solitary in the female, 3-4 inches long, bracts triangular ovate acute 3-flowered in the male and 1-flowered in the female, flowers small, calyx hoary tomentose and furnished with red glands, stamens about 26, anthers glandular, styles shortly united with plumose recurved branches, capsule 3 coccous, each of the cocci the size of a small pea, covered with red glandular tomentum. *DC. Prod* xv. 980. Croton Philippinensis, *Lam. Ency. vol.* 2, *p.* 206. C. punctatus, *Retz.* C. coccineus, *Lam.* C. montanus, *Willd.* Rottlera tinctoria, *Roxb. Fl. Ind.* iii. *p.* 827. R. aurantiaca, *Hook. et Arn.* R. affinis, *Hassk.*

This tree is common throughout the Madras presidency, and in Bengal, Bombay, Birmah, Ceylon, &c., and it is also found in Java, the Philippines, Australia and Hongkong. In Southern India it ascends the mountains to about 5000 feet, but is also common in the forests of the plains; the wood is occasionally used by the natives for ordinary purposes, and the bark is in use for tanning. The red mealy powder off the capsules is a valuable product and might be a source of considerable revenue in many of our forest districts; it is used as an orange dye principally for silk. The ripe capsules are gathered in March and rubbed together or shaken in bags till the farina separates. It is known as Kapli or Kamila powder, and the silk dyers use the following method:—4 parts of the powder, 1 part of powdered alum, 2 parts of salts of soda, rubbed well together with oil of Sesamum and then boiled in water; it is sufficient however to mix it with water containing ½ its weight of carbonate of soda. The powder is much adulterated in our bazaars, but some collected carefully by the Forest Department, realized a high price in the English markets. The tree is called Kapli almost throughout this Presidency, and is known by the names of Kameel and Kamila in Hindoostani; and in Ceylon it is called Hamparandella, and in Bombay Shendree; the powder is also supposed to be of value as a vermifuge.

Analysis.

1. A portion of the male inflorescence magnified.
2. A male flower bud, calyx 4-cleft, segments valvate.
3. The same more advanced, showing the red glandular dots.
4. A full flower, stamens central about 26, no petals, or disk, or abortive ovary.
5. Anthers, front and back view, showing the glandular dots.
6. Female flower.
7. Calyx.
8. Ovary cut vertically, ovules pendulous.
9. A style very highly magnified.
10. Ovary cut transversely, 3-celled, cells 1-ovuled.
11. A capsule.
12. Lower portion of a leaf upper surface, showing the 2 glands at the base. (All drawn from living specimens.)

Gerard del.

Mallotus Philippinensis, Lam.

MISCHODON ZEYLANICUS. (Nat. order Euphorbiaceæ.)

MISCHODON, *Thw.*— GEN. CHAR. Diœcious, calyx of both sexes imbricate 6-(rarely 4-5-) parted, petals wanting or 1-4 present much smaller than the calyx-lobes. *Male*, stamens 6 (rarely 4-5-7) inserted round the base of the 3-lobed rudiment of an ovary, which is imbedded in the disk; filaments elongate free at the base opposite the calyx-segments when equal in number, anthers 2-celled dehiscing longitudinally (cells at length divaricate) affixed nearly at the apex. *Female*, disk thick annular more or less lobed conspicuous, ovary 3-(rarely 4-) lobed, 3-(rarely 4-) celled, cells 2-ovuled, the ovules pendulous from a thick placenta, stigmas subsessile as many as the cells of the ovary connate at the base, dilated at the apex, somewhat recurved simple or somewhat 2-lobed, capsule 3-(rarely 4-) coccous, seeds ovoid slightly compressed ecarunculate and exarillate, solitary in the cells, furnished with a conspicuous hook at the apex, testa smooth castaneous, cotyledons oblong, radicle short. A tree, leaves opposite or 3-5-verticellate penniveined entire, flowers small in axillary panicles. *Thw. in Hook. Kew Journ. of Bot.* 1854, *p.* 299, *t.* 10-*B.*

MISCHODON ZEYLANICUS. (Thw.) A large tree, young branches tetragonous minutely pubescent, leaves glabrous except when very young, 3-5-verticellate, entire oblong obtuse or emarginate at the apex, narrow towards the base, 4-15 inches long by 1-5 inches broad, minutely reticulated; petioles pubescent ¼ to 1½ inch long. *Male*, panicles pubescent axillary about 3 inches long bracteated, the glomerules many-flowered, pedicels short, stamens about 3 times as long as the calyx, filaments and anthers hairy, female panicles or racemes shorter than the male but somewhat elongating in fruit, ovary hairy, capsule glabrous 10-15 lines in diameter, seed brown, hooked at its apex. *Thw. l. c.* ;—*DC. Prod.* xv. *p.* 1124. (Wrong as to the number of the ovules.)

This fine tree is common in Ceylon in the vicinity of Colombo and near Kandy; the young leaves are of a beautiful red color; it is known by the name of Tamana. The timber is excellent. It seeds abundantly, and is most readily propagated from seed, and has been introduced into this presidency. I do not know that it occurs in our southern provinces, but I have a specimen of doubtful origin.

Analysis.

The figure represents branch of female tree in fruit.

1. Portion of a male panicle magnified.
2. A male flower open, showing 6 sepals and 1 petal, 6 stamens each opposite one of the sepals, and the abortive 3-lobed ovary.
3. Male flower, side view, showing 6 stamens.
4, 5. Male flowers with 4-5 stamens.
6. Anther, front view, cells somewhat divaricate, filament and anther-cells hairy.
7. Anther, back view, filament attached nearly at the apex at the back.
8. Female inflorescence.
9. Female flowers, petals sometimes present, ovary 3-lobed seated on a thick disk, styles short thick recurved.
10. A 6-cleft female calyx open.
11. Female flower with a 4-lobed ovary and 4 styles.
12. Ovary cut vertically, ovules 2 in each cell attached to a thick placenta pendulous from rather above the apex of the axis.
13. Ovary cut transversely, 3-celled, each cell 2-ovuled.
14. A 4-lobed ovary cut transversely.
15. A fruit with 3 cocci.
16. A fruit with 4 cocci.
17. Valves of the fruit after it has burst.
18. A seed showing the hook at the apex.
19. Seed cut vertically, showing the embryo lying in albumen. (All drawn from flowers in spirits.)

Mischodon Zeylanicus Hew.

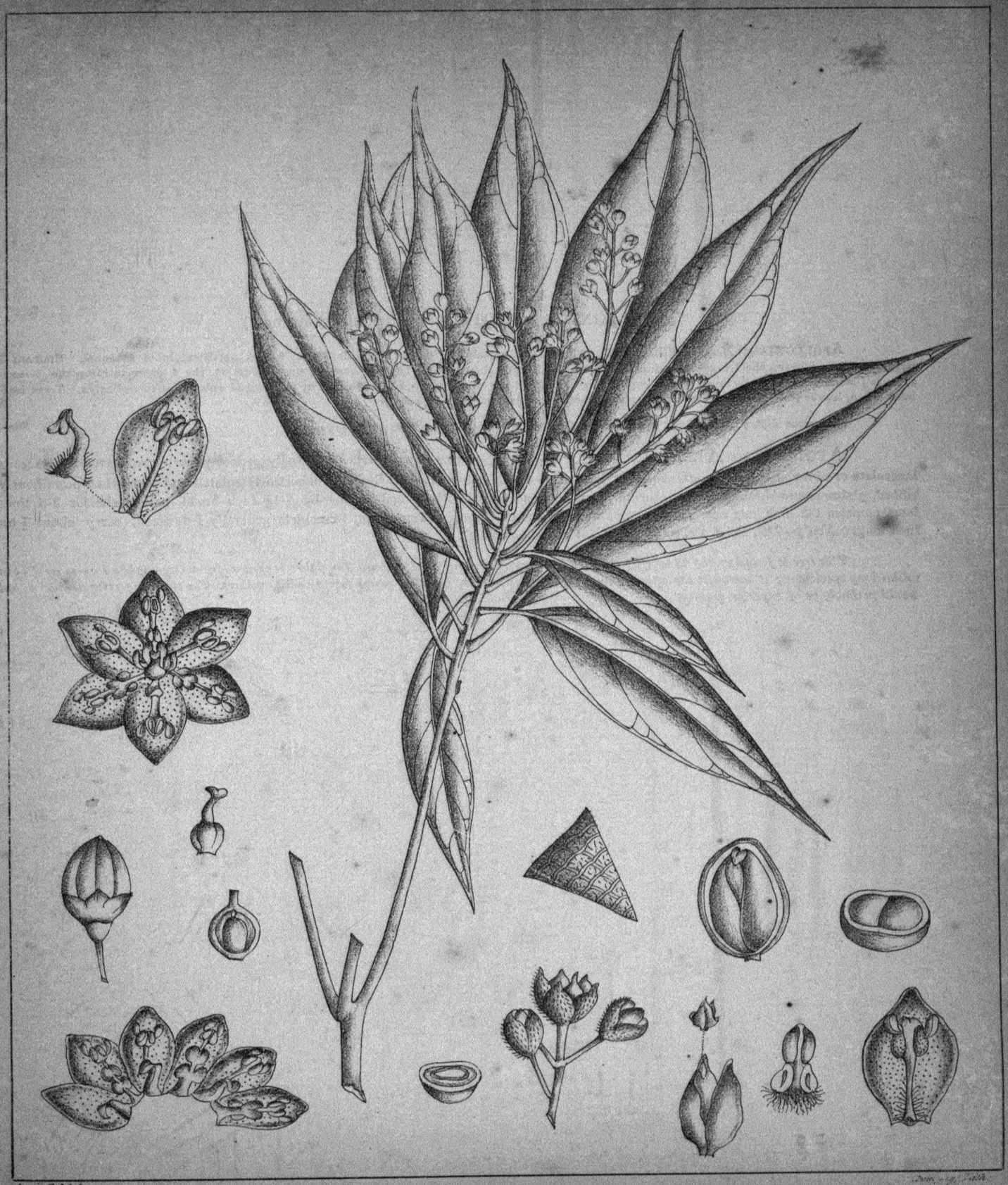
APOLLONIAS ARNOTTII. (Nat. order Laurineæ.)

APOLLONIAS, *Nees.*—GEN. CHAR. Flowers hermathrodite, calyx infundibuliform 6-cleft persistent, lobes subequal. Stamens 9 fertile, filaments filiform, the 3 inner ones furnished with 2 stipitate glands at the base, anthers oblong all 2-celled, the 6 outer introrse, the 3 inner extorrse; staminodes 3. Style short, stigma depresso-subcapitate, berry oval surrounded at the base by the 6-lobed enlarged hardened calyx. Trees, leaf-buds naked, leaves penniveined, panicles axillary and subterminal, flowers small naked.

This genus differs from Phœbe in its 2-celled anthers, and from Hassia in its persistent calyx.

APOLLONIAS ARNOTTII. (Nees.) A good sized tree, young parts adpressedly sericeo-puberulous, leaves chartaceous lanceolate or oblongo-lanceolate attenuated at both ends much acuminated, delicately immerso-reticulated and somewhat prominently ribbed, glabrous and shining above, sparingly puberulous beneath, $2\frac{1}{2}$-$5\frac{1}{2}$ inches long by $\frac{3}{4}$-$1\frac{1}{4}$ inch broad, petiole slender 3-5 lines long, panicles 1-2 inch long sparingly puberulous or at length glabrous racemiform, branchlets generally 1-flowered, berry about $\frac{1}{2}$ an inch long. *Nees*;—*DC. Prod.* xv. *p.* 65;—*Wight Icones tab.* 1819.

This tree is found on the Tinnevelly and Travancore ghats, and in Malabar. The figure is copied from Dr. Wight's Icones, as I have mislaid my specimens; it has quite the appearance of Phœbe lanceolata, but that genus has 4-celled anthers. The timber is quite unknown, but would probably be of superior quality.



Fourcade del. Dun. sc. Calcutta.

Apollonias Arnottii, Nees.

PHŒBE WIGHTII. (Nat. order Laurineæ.)

PHŒBE, *Nees.*—GEN. CHAR. Flowers hermathrodite, calyx infundibuliform 6-cleft, lobes subequal persistent with the hardened tube, fertile stamens 9, filaments filiform, the 3 inner ones each furnished with 2 glands at their base, anthers ovate all 4-celled, the 6 outer introrse, the 3 inner extrorse, staminodes 3 stipitate cordate at the apex. Style filiform, stigma angulato-discoid, berry seated on the cup-like 6-cleft persistent calyx which is supported by the more or less thickened pedicel. Trees, leaves alternate or subverticelled, penniveined or (in species not Indian) 3-nerved, flowers naked in axillary or terminal subcymose panicles.

PHŒBE WIGHTII. (DC.) A good sized tree, branchlets tawny pubescent, leaves coriaceous oblong obovate or elliptic acute or acuminate, above glabrous in age (except sometimes the impressed costa and veins) and somewhat shining, beneath tawny pubescent, penniveined, the veins much raised beneath, the veinlets prominently reticulated beneath but invisible above, 2-5 inches long by 1-2¼ inches broad, petioles tawny 3-6 lines long, panicles tawny-pubescent axillary shorter than the leaves racemiform or sparingly branched, branchlets 3-flowered, flowers hoary, fruit-calyx much enlarged. *DC. Prod.* xv. 38. Phœbe lanceolata, *Wight Icones tab.* 1820 (not *Nees.*)

This tree is very common about Ootacamund and the higher ranges of the Nilgiris, and in many other localities along our Western Ghats at considerable elevations, but it is absent from Ceylon. It is in flower and fruit all the year round. The tree is called Kumara by the Burghers on the Nilgiris ; it yields a good dense wood of a light red colour, which is in use for various purposes with the natives.

Analysis.

1. Portion of the racome.
2. Flower buds.
3, 4. A full flower opened out and the ovary removed, calyx 6-fid, stamens 9, the 6 exterior with 4-celled introrse anthers, the 3 interior with 4-celled extrorse anthers, and with 2 glands at the base; staminodes 3 stipitate opposite alternate exterior stamens.
5. Inside view of one of the 3 interior stamens, showing the two glands at its base and its extrorse anthers.
6. Outside view of the same.
7. One of the alternate stamens of the outer row with the staminode in front of it, anthers introrse.
8. A staminode.
9. Ovary, style and stigma.
10. Ovary cut vertically.
11. Ovary cut transversely.
12. Portion of a branch in fruit, the berry seated in the persistent calyx with the pedicel thickened. (Drawn from living specimens.)

Covindo del. Dumpfrey, Lith.

Phœbe Wightii DC.

TETRANTHERA WIGHTIANA. (Nat. order Laurineæ.)

TETRANTHERA, *Jacq.*—GEN. CHAR. Flowers diœcious. Perianth-segments 6, equal or nearly so, or rarely unequal or fewer by abortion. Stamens of the outer series usually 6, perfect, of the inner series either 6 perfect, or 3 perfect alternating with 3 staminodia, or the whole number more or less increased; anthers all introrse, or the inner ones sub extrorse, 4-celled; glands usually 6, one on each side of 3 inner stamens, the stamens reduced to staminodia in the female flowers, but the glands usually present. Ovary imperfect or wholly abortive in the males, free in the females; stigma usually dilated and toothed or lobed. Berry resting on the more or less enlarged flat concave or cup-shaped perianth-tube, the segments deciduous. Trees, leaves alternate or rarely irregularly opposite penniveined. Flowers in cymes reduced to small umbels, heads or clusters within an involucre of 4 concave deciduous bracts arranged in short racemes or clusters in the axils or at the leafless nodes.—Cylicodaphne, *Nees*;—*Benth. Fl. Aust.* v. 304.

TETRANTHERA WIGHTIANA. (Wall). A good sized or large tree, branchlets compressedly angular at the apex, fusco-tomentose; leaves rigidly coriaceous elliptic or oval or obovate-oblong obtuse or acute, above green and glabrous except the costa, the veins impressed, the veinlets obscure, beneath rather densely tomentose and glaucous or sub-glabrous, the veins and veinlets very prominent and much raised, 3-8 inches long by 1-3 inches broad, petioles 3-8 lines long; racemes 1-3½ inches long floriferous nearly to the base hoary or fusco-puberulous; involucre 4-5 leaved 4-6 flowered, when closed 3-4 lines, when open 5-6 lines in diameter, the inner leaves of the involucre and calyx silky; stamens pilose at the base; berry oval, nearly ½ an inch long, half immersed in the cup-shaped enlarged truncated tube of the calyx. *Wall. List. N.* 2557. Cylicodaphne Wightiana, *Nees*;—*DC. Prod.* xv. 200;—*Wight Icones tab.* 1833.

Vary α. *tomentosa*—Leaves densely fulvo-or fusco-tomentose beneath.

Vary β. *glabrescens*—Leaves sparingly puberulous or glabrous beneath.

A handsome tree, common in many of our western forests from Canara down to Cape Comorin, from about 2000 *feet elevation up to about* 8000; *it is very abundant on the Nilgiris, where it is called Keynjee by the Burghers. The wood is yellowish, with a satiny appearance, and a darker heart; it is used for rafters and various other purposes.*

Analysis.

The plate represents the male and female trees.

1. An involucre of male tree in young state.
2, 3. Involucre of male flowers.
4. A male flower opened, 12 stamens, the 6 outer introrse, the 6 inner subextrorse and furnished with 2 glands at the base.
5. 2 stamens, one of the outer and one of the inner series, with the 2 glands at the base of the latter.
6. The abortive ovary.
7. An involucre of the female tree in young state.
8. An involucre of flowers.
9. A flower bud.
10. A female flower opened out, stamens 12 sterile.
11, 12. The sterile stamens.
13. Ovary, style and stigma.
14. Ovary cut vertically.
15. Fruit, the berry semi-immersed in the cup-like tube of the calyx. (Drawn from living specimens.)

Tetranthera Wightiana (Wall.)

LITSÆA ZEYLANICA. NEES. (Nat. order Laurineæ.)

LITSÆA, *Juss.*—GEN. CHAR. Flowers diœcious, calyx 4-6 parted, lobes subequal. *Male*, stamens 6, the 2 interior ones with 2 glands at the base, anthers all 4-celled and introrse. Staminodes none. *Female*, sterile stamens 4-6 ligulate or spathulate, the 2 or 3 inner ones furnished with glands on both sides at the base. Style filiform. Stigma discoid. Berry resting on the flat sometimes dilated perianth-tube, the segments persistent or deciduous. Trees or shrubs, leaves alternate frequently crowded and almost whorled at the ends of the shoots, usually penniveined but with few primary veins and the lowest pair more prominent so as often to appear triplinerved. Flowers in sessile or nearly sessile clusters, surrounded by several very deciduous imbricate bracts.

LITSÆA ZEYLANICA. (Nees.) A large tree, the branches and inflorescence quite glabrous or scarcely hoary with a very minute tomentum. Leaves ovate-elliptical or elliptical-oblong acuminate, contracted at the base, 3 to 5 inches long, glabrous and green above, white or glaucous underneath, penniveined but with few primary veins, the lowest pair more prominent than the others. Flowers in sessile clusters in the axils or at the old nodes, on pedicels of 1 to 2 lines, usually glabrous as well as the perianths. Perianth-segments ovate oblong obtuse. Filaments exserted, with a few hairs about the base ; glands of the two inner ones stipitate. Berry globular or slightly ovoid, resting on the persistent perianth-tube, expanded into an entire or slightly angular flat disk of 2½ to 3 lines diameter, the segments entirely deciduous. *Meisn. in DC. Prod.* xv. i. 226 ;—*Wight Ic. t.* 132 *and* 1844 ;—*Benth. Fl. Aust.* v *p.* 307. L. foliosa, *DC. Prod.* xv. 222. L. scrobiculata, *DC. l. c. p.* 223. L. umbrosa et consimilis, *DC. l. c. p.* 223.

This tree is most abundant on the Nilgiris at 6000-7000 *feet elevation, and is found throughout our Western Ghats at elevations above* 2000 *feet, and it is equally common in Ceylon, where it is called Dawal-kooroondoo. Its wood is in use for house-building purposes, planks, rafters, &c., it is yellowish in color, straight-grained and tough, and when fresh emits an odour of Sweet Briar ; it is called Belori by the Burghers on the Nilgiris.*

Analysis.

The figure represents a branch of the female tree.

1. A male flower.
2. The same open, calyx 4-parted, stamens 6, anthers all introrse and 4-celled, the 2 interior stamens with a pair of glands at the base. No staminodes.
3. One of the exterior and 1 of the interior stamens removed.
4. Abortive ovary.
5. Involucre of male flower.
6. Involucre of female flower.
7. A female flower.
8. The same open, 6 sterile ligulæform stamens, the 2 interior with glands.

9, 10. Sterile stamens removed from the flower.

11. Ovary cut vertically.
12. Fruit. (Drawn from living specimens.)

Gerrendo del.

Dunnebier Lith.

Litsæa Zeylanica (Nees)

ACTINODAPHNE SALICINA. (Nat. order Laurineæ.)

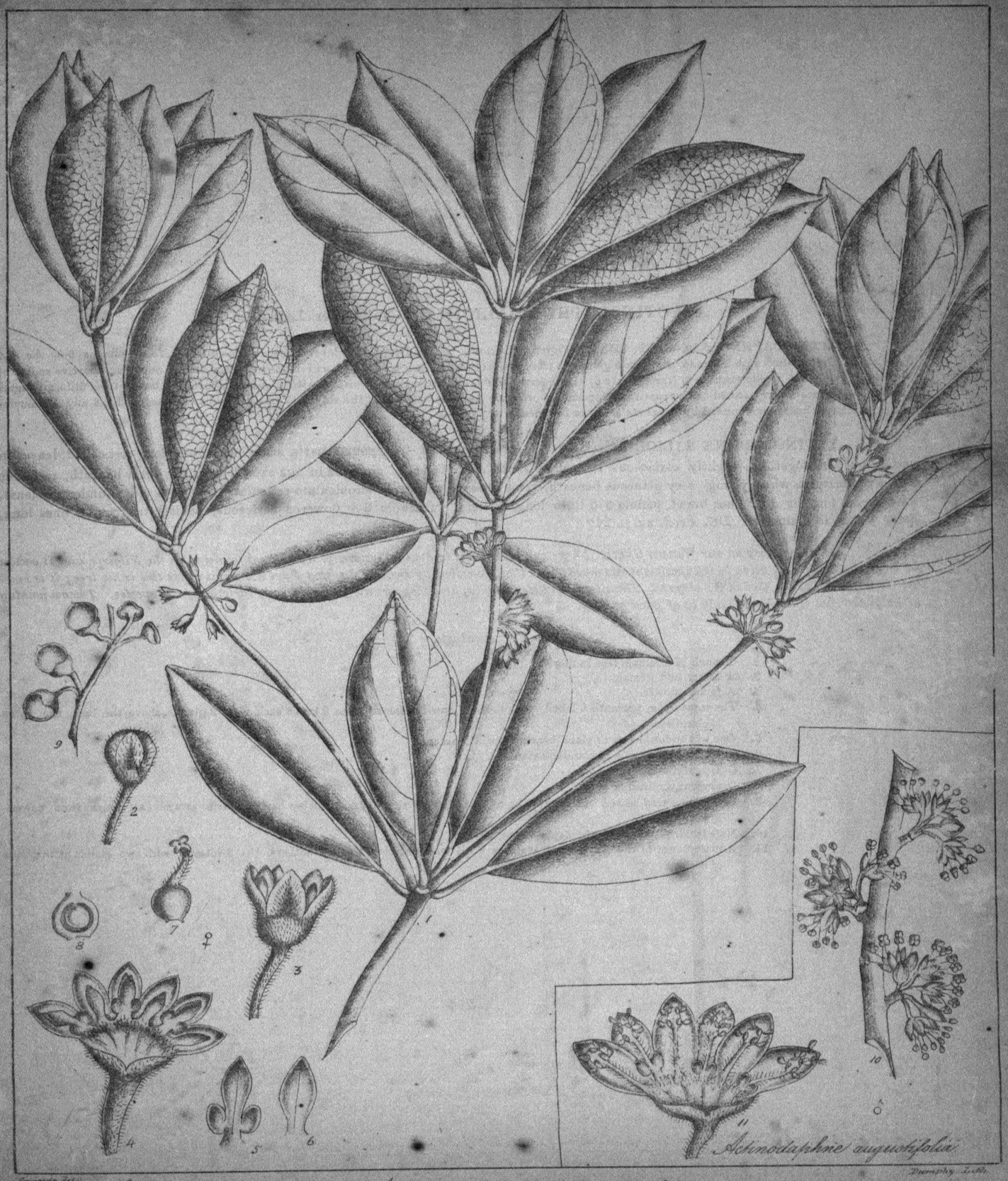
ACTINODAPHNE, *Nees.*—GEN. CHAR. Flowers diœcious, calyx 6-4-fid, the lobes subequal deciduous. *Male*, stamens 9-6, the 3-2 inner ones each furnished with 2 sessile or stipitate glands at the base, anthers oblong all 4-celled and introrse. Staminodes none, an abortive rudiment of an ovary. *Female*, sterile stamens 9, (rarely only 6) ligulæform, the 3(-2) inner ones furnished with 2 glands above the base, style filiform, stigma discoideo-sublobate ; berry seated on the persistent cup-shaped or rarely flat truncate base of the calyx. Trees or shrubs, flowers without any involucres entire in sessile clusters surrounded by imbricate scales or in racemes or panicles.

ACTINODAPHNE SALICINA. (DC.) A middling sized tree, young parts sericeous, branchlets verticelled, leaves in verticels of 5-8 together, slightly coriaceous lanceolate acute at both ends, glabrous in age except often the costa beneath, sericeous round the margins when young, very glaucous beneath, veins obscure, minutely scrobiculato-reticulated on both sides (under the lens), 2½-5 inches long by 5-12 lines broad, petiole 3-6 lines long, fascicles subsessile 3-8 flowered sericeous, pedicel in fruit 4 lines long, berry 4 lines in diameter. *DC. Prod.* xv. *p.* 212.

This tree is rare on our Western Ghats. I have only detected it in South Tinnevelly. Dr. Wight found it on the Nilgiris, and it occurs in Ceylon ; the primary veins in my specimens are much fewer than described by DeCandolle, and I am not certain that this is his tree ; it is however closely allied to the Ceylon A. elegans, Thwaitesii, and stenophylla, and they are all probably only varieties of one species. I know nothing of its timber, but it would probably be of good quality.

Analysis.

1. Branch of a female tree in flower.
2. A flower bud (female.)
3. A female flower.
4. The same open, perianth 6-lobed, 9 ligulæform sterile stamens, the 3 inner each with 2 glands above the base, the outer glandless.
5. One of the inner row of gland bearing sterile stamens.
6. One of the outer row of glandless stamens.
7. Ovary, style and stigma.
8. Ovary cut vertically.
9. Fruit, the berry seated in the cup-like truncate base of the calyx, the lobes having fallen away. (All drawn from flowers in spirits.)
10. Male inflorescence of Actinodaphne angustifolia.
11. A male flower of the same open, stamens 9 all with introrse 4-celled anthers, the 3 interior with two glands at the base of each.



Gomez del. Dempsey Lith.

Actinodaphne salicina (D.C.)

ACTINODAPHNE HOOKERI. (Nat. order Laurineæ).

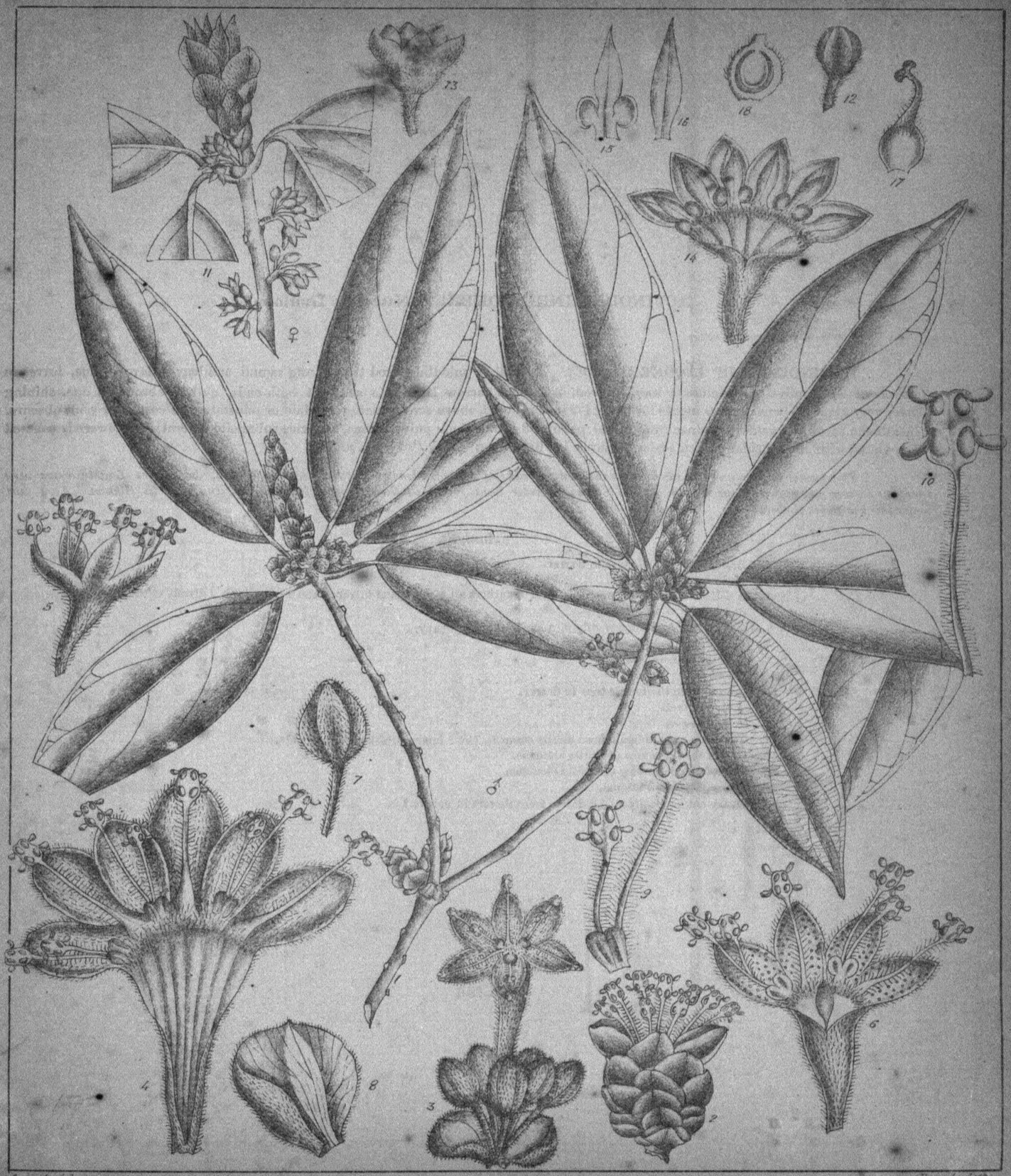
For Gen. Char. see Pl. ccxcv.

ACTINODAPHNE HOOKERI. (DC). A small or middling sized tree, young ramuli and leaves flavo-villous, leaves in verticels of 5-8 penniveined or more or less 3-nerved, coriaceous narrow lanceolate acute at both ends, quite glabrous in age, shining above, very glaucous beneath, 5-9 inches long by 1¼-2 inches broad, above scrobiculato-reticulate or punctate, the costa and veins obscure, beneath the costa and veins prominent and raised, petioles 3-8 lines long pulveraceous, fascicles subsessile lateral few-flowered, covered when young with suborbicular golden scales, pedicels 1-2 lines long. *DC. Prod.* xv. *p.* 218.

This tree is very common on the hills on the eastern side of the presidency (North Arcot, Cuddapah, &c.) where Laurineæ are very rare, but I never met with it in our western forests; it has however been found in Bombay and the Concan, and also in Sikkim. I am not acquainted with its timber.

Analysis.

1. Branch of the male tree in flower.
2, 3. Male inflorescence.
4. A 6-lobed male flower open, stamens 9, anthers all 4-celled and introrse, the 3 inner with 2 glands at the base.
5. A 4-lobed male flower.
6. The same open, stamens only 6, a small abortive ovary.
7. A male flower bud.
8. A bract or floral scale.
9, 10. Stamens.
11. Branch from the female tree in flower.
12. A flower bud.
13. A full flower.
14. The same open, 9 ligulæform sterile stamens, the 3 inner furnished with glands.
15. One of the inner row of sterile stamens.
16. One of the outer row of sterile stamens.
17. Ovary, style and stigma.
18. Ovary cut vertically. (All drawn from flowers in spirits.)



Bowerdo del. Humphry Lith.

Actinodaphne Hookeri (D.C.)

ALSEODAPHNE SEMICARPIFOLIA. (Nat. order Laurineæ.)

ALSEODAPHNE, *Nees.*—GEN. CHAR. Flowers hermathrodite, calyx deeply 6-parted, lobes subequal deciduous from the base, fertile stamens 9, filaments filiform or dilated, the 3 inner furnished with 2 subsessile glands near the base ; anthers ovato-oblong 4-celled, those of the 6 outer stamens introrse, those of the 3 inner extrorse. Staminodes 3 stipitate cordate or sagittate at the apex. Style filiform, stigma discoid or obtusely subtrigonal, berry seated on the entire smooth base of the calyx, the pedicels thickened. Trees, leaves alternate coriaceous penniveined, inflorescence of Cinnamomum, outer segments of calyx usually shorter than the inner ones.

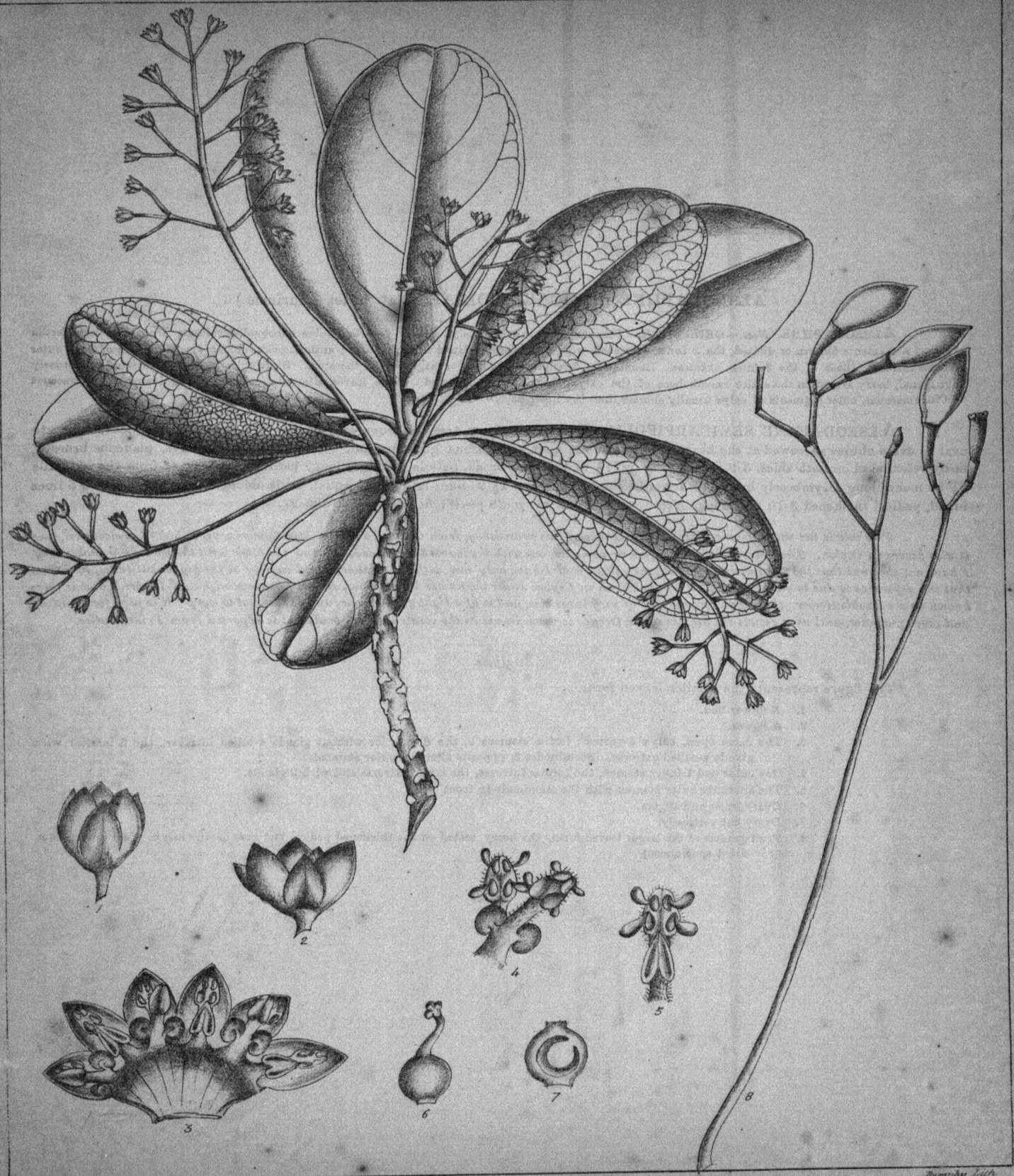
ALSEODAPHNE SEMICARPIFOLIA. (Nees.) A large tree, glabrous except the very young shoots, leaves obovate oval or ovate obtuse narrowed at the base, rounded at the apex, coriaceous glabrous and somewhat shining above, glaucous beneath, finely reticulated on both sides, 3-9 inches long by 1½ to 4 inches broad, petiole 3-9 lines long, panicles axillary or from the old axils 2½-10 inches long corymbosely branched towards the apex, calyx 1½-2 lines long, lobes equal, fruit oblong 4-8 lines long by 3-5 lines broad, pedicel thickened 3-10 lines long. *Nees* ;—*DC. Prod.* xv. *p.* 28 ;—*Wight Icones Pl.* 1826 27.

This tree is not uncommon on the Western Ghats of this presidency, from Canara down to Cape Comorin, up to 5000 feet elevation, and it also occurs in Ceylon. There are 2 different forms or varieties, one with the leaves 3-4 inches long, and the other with the leaves 6-9 inches long. I have not observed that the 2 forms run one into the other, and I have only met with the smaller leaved variety at the higher altitudes, so suspect that the difference is due to elevation. This tree is known in Ceylon under the names Weewarana, Raane (grainwood), and Yaverne, and is there known as a valuable timber ; the wood is procurable of very large size, and is of a light yellow color, and is said not to warp ; it is used for building and other purposes, and as it resists the attacks of the teredo, is much in use in the construction of boats ; it is exported from Trincomallee.

Analysis.

The figure represents the smaller leaved form.

1. A flower bud.
2. A flower.
3. The same open, calyx 6-parted ; fertile stamens 9, the 6 exterior without glands 4-celled introrse, the 3 interior with glands 4-celled extrorse. Staminodes 3, opposite alternate outer stamens.
4. One outer and 1 inner stamen, the former introrse, the latter extrorse and with 2 glands.
5. The alternate outer stamen with the staminode in front of it.
6. Ovary, style and stigma.
7. Ovary cut vertically.
8. Fruit-panicle of the larger leaved form, the berry seated on the thickened pedicel and base of the calyx. (All drawn from dried specimens.)



Bowman del. Dumphy Lith.

Alsodaphne semicarpifolia, (Nees)

HAASIA WIGHTII. (Nat. order Laurineæ.)

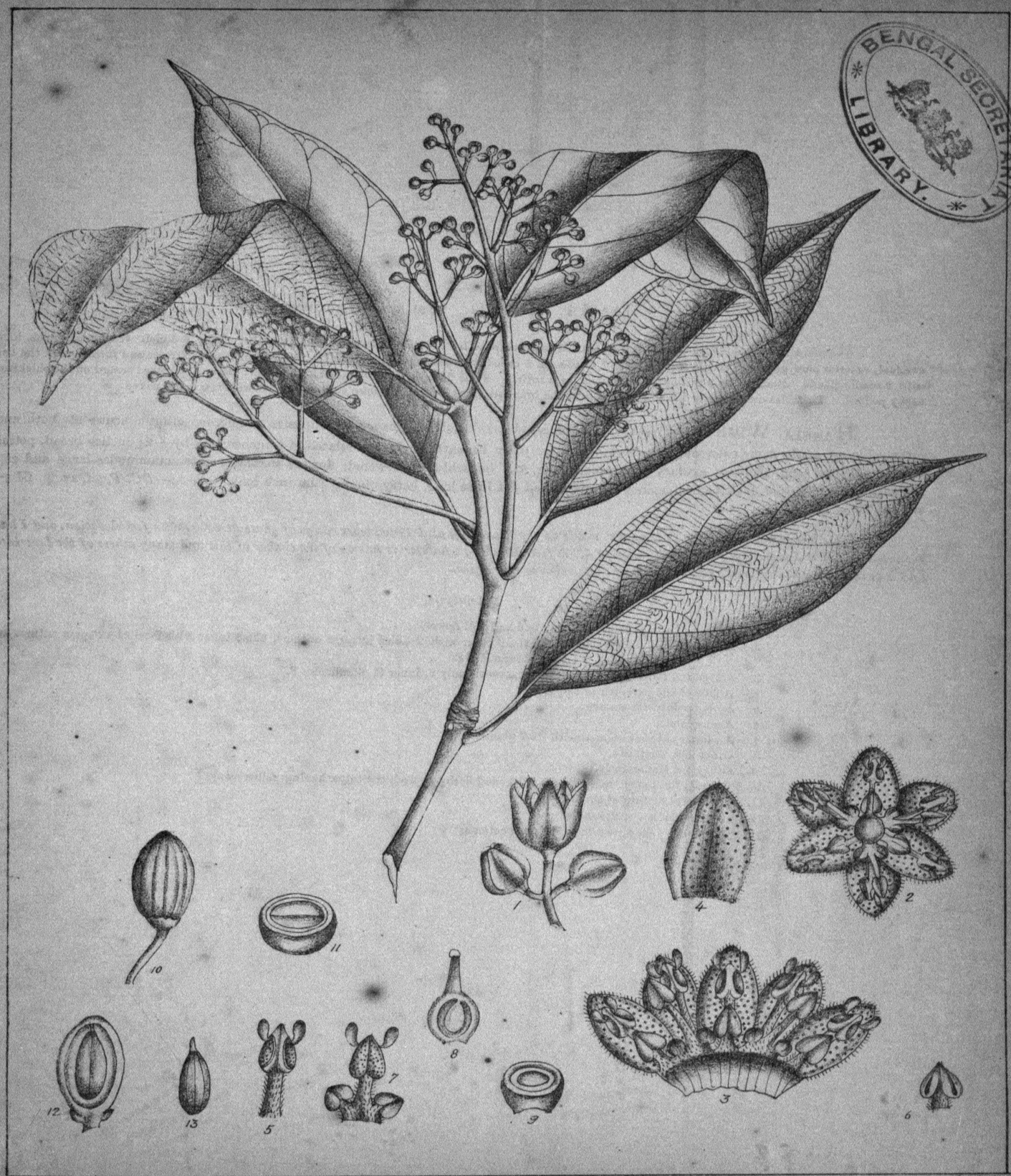
HAASIA, *Blume.*—GEN. CHAR. Flowers hermaphrodite or by abortion monœcious, calyx rather fleshy 6-5 cleft wholly deciduous, lobes unequal, exterior ones generally small, stamens 9 or 7 fertile all 2-celled, the 6-5 outer ones introrse, the 3-2 inner ones extrorse and furnished at the base with 2 sessile glands. Staminodes 3 triangular subsessile, or wanting. Style filiform. Stigma discoid triangular. Berry oval naked seated on the thickened fleshy pedicel. Trees, leaves generally towards the apex of the branches, penniveined, panicles subterminal, flowers few small naked.

HAASIA WIGHTII. (Nees.) A good sized tree glabrous, leaves subopposite coriaceous elliptic acute at both ends rather shining, of the same color on both sides or a little paler beneath, finely reticulated, 4-6 inches long by $\frac{3}{4}$-$2\frac{1}{4}$ inches broad, petiole slender 4-9 lines long, panicles axillary 1-4 inches long, the branchlets 3-flowered, flowers hermathrodite, staminodes large and conspicuous pellucid-dotted, fruit-pedicel somewhat thickened 3-4 lines long, berry oblong $\frac{1}{2}$ an inch long. *Nees;—DC. Prod.* xv. *p.* 61 ;—*Wight Icones tab.* 1831.

This tree is not uncommon in the moist woods on the Tinnevelly and Travancore range of ghats at 2000-3000 *feet elevation, and I have specimens from the Anamallays from an elevation of* 4,000 *feet. Nothing whatever is known of the timber of this and many others of the Laurineæ, and it is important that Forest officers should pay atten tion to this order.*

Analysis.

1. Portion of a panicle shewing the bud and full flower.
2. A 6-parted full flower stamens 9, the 6 outer with 2-celled introrse anthers, the 3 inner with 2-celled extrorse anthers and with 2 glands at the base, staminodes 3.
3. A 5-parted flower opened out, outer stamens only 5, inner 2, staminodes 3.
4. A lobe of the perianth or calyx.
5. An outer introrse stamen.
6. A staminode.
7. An inner extrorse stamen with its 2 glands.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. A fruit, the berry seated on the thickened fleshy pedicel, the calyx having fallen away.
11. Transverse section of the berry.
12. Vertical section of the same.
13. The seed. (All drawn from living specimens.)



BENGAL SECRETARIA LIBRARY.

Govinda, del. Dumphy, Lith.

Haasia Wightii. (Nees)

CRYPTOCARYA WIGHTIANA. (Nat. order Laurineæ.)

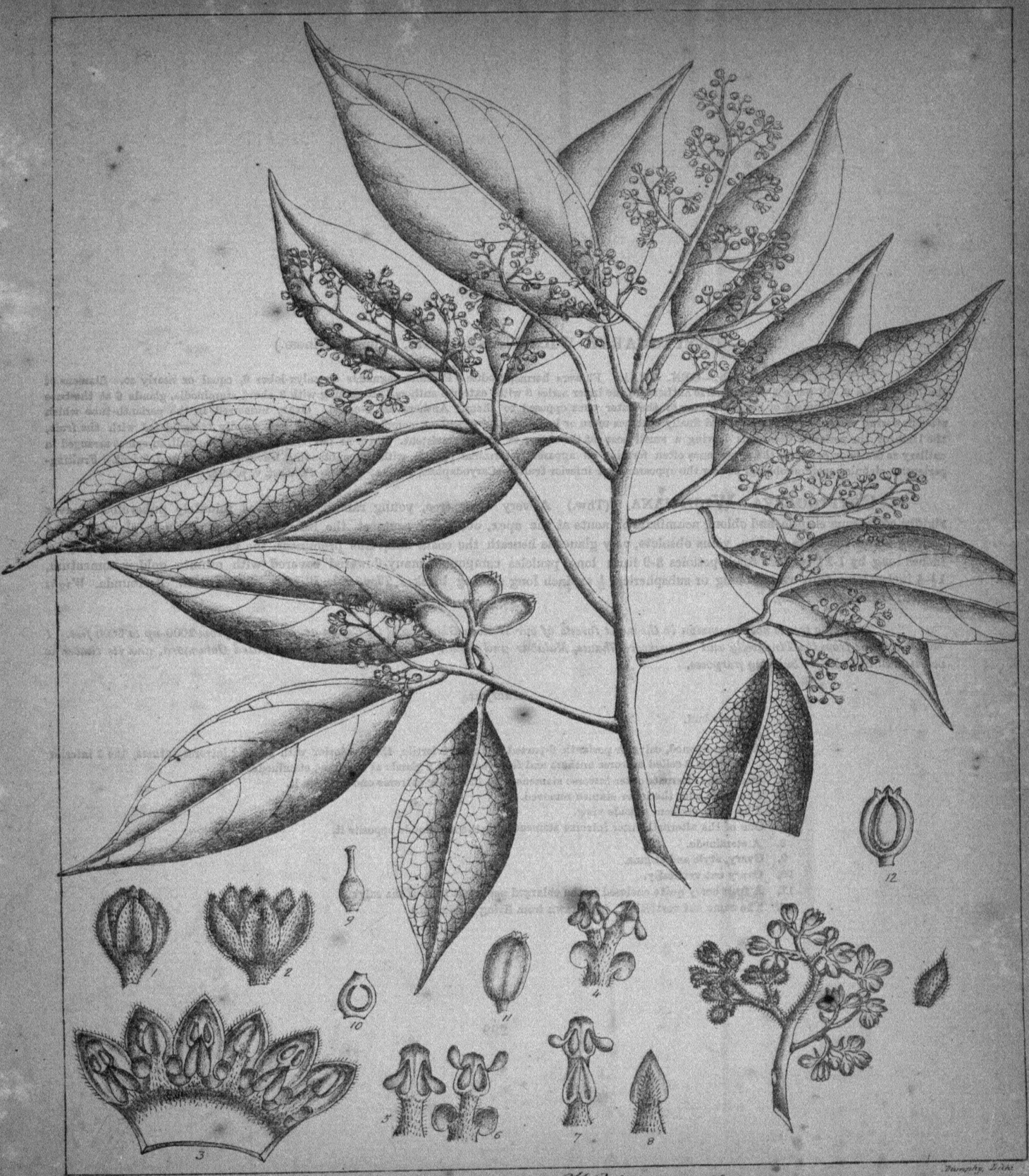
CRYPTOCARYA, *R. Br.*—GEN. CHAR. Flowers hermaphrodite. Perianth-segments or calyx-lobes 6, equal or nearly so. Stamens of the outer series 6, all perfect with introrse anthers, of the inner series 3 with extrorse anthers, alternating with 3 short staminodia, glands 6 at the base of the inner perfect stamens or almost as near to the outer ones opposed to them. Anthers all 2-celled. Ovary immersed in the perianth-tube which after flowering closes over the ovary, and finally becomes more or less fleshy or succulent, completely enclosing and usually consolidated with the fruit, the limb of the perianth deciduous leaving a small scar at the apex, or rarely persistent. Trees or tall shrubs. Flowers small, in cymes arranged in axillary racemes or panicles, the upper ones often forming an apparently terminal panicle with the subtending leaves very small or deficient. Fruiting-perianths globular ovoid or oblong, having the appearance of inferior fruits.—Caryodaphne, *Blume*;—*Benth. Fl. Aust.* v. *p.* 294.

CRYPTOCARYA WIGHTIANA. (Thw.) A very large tree, young ramuli and leaves minutely puberulous, leaves rigidly coriaceous elliptic and oblong acuminate or acute at the apex, obtuse or acute at the base and often unequal, glabrous and shining above the costa sunken, veins obsolete, very glaucous beneath the costa and veins prominent, the veinlets much reticulated, 2-6 inches long by 1-2½ inches broad, petioles 3-9 lines long, panicles compound many-flowered covered with minute golden tomentum, 1½-4 inches long, fruit ovate-oblong or subspherical ½ an inch long shining black. *Thw. En. Pl. Zey. p.* 254. C. floribunda, *Wight Icones t.* 1829. (not *Nees*).

This fine tree is not uncommon in the moist forests of our Western Ghauts and in Ceylon at elevations from 2000 *up to* 5000 *feet. I have specimens from the Tinnevelly and Travancore Ghauts, Malabar and South Canara. In Ceylon it is called Golu-mora, and its timber is considered valuable for building purposes.*

Analysis.

1. A flower bud.
2. A flower.
3. A flower opened, calyx or perianth 6-parted, stamens 9 fertile, the 6 exterior with 2-celled introrse anthers, the 3 interior with 2-celled extrorse anthers and furnished with 2 glands at the base, staminodes 3.
4. One of the alternate outer introrse stamens with the inner extrorse one opposite it.
5. The same with the inner stamen removed.
6. The inner stamen, outside view.
7. One of the alternate outer introrse stamens with the staminode opposite it.
8. A staminode.
9. Ovary, style and stigma.
10. Ovary cut vertically.
11. A fruit berry quite enclosed in the enlarged persistent tube of the calyx.
12. The same cut vertically. (All drawn from living specimens.)



Cocuzzo del.

Dalmaty, Lith.

Cryptocarya Wightiana (Thw.)

HERNANDIA PELTATA. (Nat. order Laurineæ; Sub order Hernandieæ.)

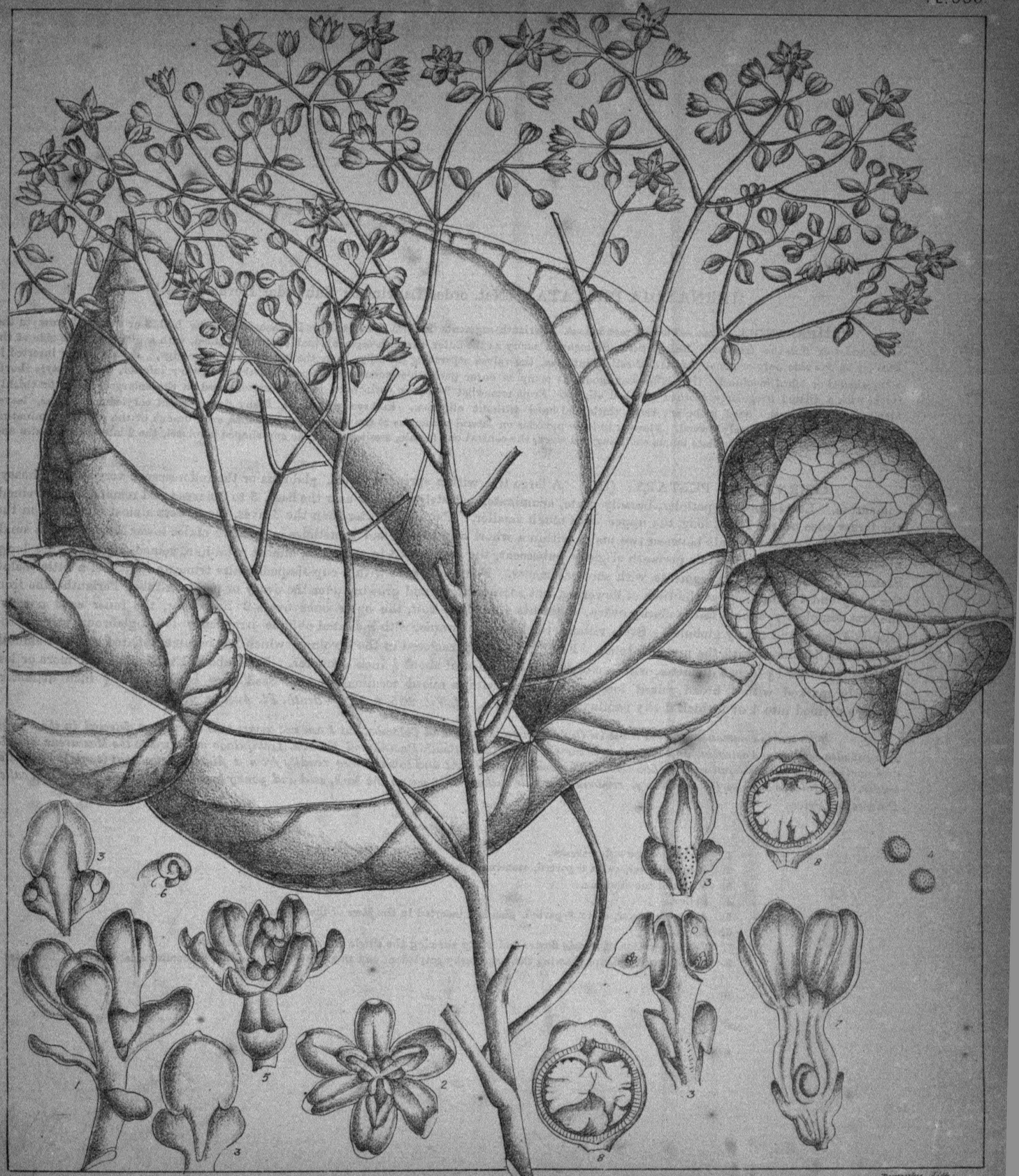
HERNANDIA, *Linn.*—Flowers monœcious. Perianth-segments in two rows, valvate in each row in the bud, 3 or 4 in each row in the males and 4 or 5 in the females. *Male flower.* Stamens as many as the outer perianth-segments and opposite to them, with a gland on each side at the base (or on one side only or none); anthers 2-celled, introrse, the valves separating laterally from the inner to the outer edge. *Female flower* inserted in a cup-shaped or lobed involucel. Glands or staminodia as many as outer perianth-segments and opposite to them. Ovary inferior, fleshy; style short, thick, with a dilated irregularly toothed or lobed stigma. Fruit somewhat fleshy or coriaceous, indehiscent, enclosed in the enlarged fleshy or thickly membranous involucel. Seed globular; testa thick and hard without albumen. Embryo with thick fleshy deeply-lobed cotyledons. Trees, leaves alternate, peltate or palmately nerved. Flowers in loose panicles on lateral peduncles at the ends of the branches, each branch of the panicle terminating in an involucre of 4 or 5 verticellate bracts enclosing 3 flowers, the central one female, sessile within the cup-shaped involucel, the 2 lateral ones males and pedicellate.

HERNANDIA PELTATA. (DC.) A large tree with a spreading head, glabrous or the inflorescence very slightly hoary-tomentose. Leaves on long petioles, broadly ovate, acuminate, peltately attached near the base, 5 to 9-nerved and remotely penniveined, the larger ones nearly 1 foot long, the upper ones much smaller. Panicles shorter than the leaves, the flowers almost clustered on the branches, one terminal female between two males within a whorl of 4 bracts, and sometimes one or two males lower down with a small bract under each pedicel. Male perianth slightly pubescent, the segments 3 in each row, almost petal-like, veined, about 2 lines long. Stamens 3, shorter than the segments with short filaments. Female flowers with a cup-shaped entire truncate involucel a little below the ovary and 1½ lines long at the time of flowering, but soon enlarged and growing over the ovary or perianth-tube. Perianth-tube from the first completely adnate to the fleshy ovary, segments 4 in each row, the outer ones ovate 2 lines long, the inner ones narrow. Glands 4, large and nearly globular. Style villous, thickened upwards, with a dilated oblique irregularly lobed glabrous stigma, the whole style deciduous with the perianth-lobes. Fruit completely enclosed in the involucel which has become inflated globular smooth and fleshy, above 1½ inches diameter, with a circular entire orifice of about ½ inch diameter. Fruit about 1 inch diameter, more or less distinctly marked with 8 broad raised longitudinal ribs, with a raised terminal umbo. Seed very hard, about ¾ inch diameter. Embryo divided into 4 or 5 thick fleshy ruminate lobes. *Seem. Fl. Vit.* 205, *t.* 32;—*Benth, Fl. Aust.* v. *p.* 314.

This tree is common on the sea coast in Ceylon between Galle and Colombo, but I am not aware that it has been detected in the Peninsula; it also occurs in Australia, and extends over the sea coasts in the South-Pacific and Eastern Archipelago westward to the Mascarene islands, and northward to the Philippines and Loo Choo. The wood is very light and takes fire so readily from a flint and steel that it might be used as tinder. The juice is a powerful depilatory, removing the hair without any pain; the bark, seed and young leaves are cathartic; the tree is called Palatee in Ceylon.

Analysis.

1. Portion of the inflorescence.
2. A male flower, calyx 6 parted, stamens 3 each with 2 glands at the base.
3. Views of the stamens.
4. Pollen.
5. A female flower, calyx 8-parted, glands 4 inserted in the jaws of the calyx.
6. Stigma.
7. Vertical section of female flower and ovary shewing the single cell and the pendulous ovule.
8. Sections of the drupe shewing the large fleshy cotyledons and small superior radicle. (All communicated by Dr. Thwaites.)



Gravenda del. Dunnsby lith.

Hernandia peltata (D.C.)

ORDER LIX—VERBENACEÆ.

Flowers irregular or rarely regular. Calyx persistent, truncate toothed or lobed. Corolla with 4 or 5, rarely 6 to 8 lobes, or rarely truncate the lobes more or less 2-lipped or nearly or quite equal, imbricate in the bud, the upper lip or uppermost lobe or sometimes the lateral ones outside. Stamens inserted in the tube of the corolla, usually 4 in pairs or nearly equal and alternating with its lower lobes, or when the corolla is regular 4 8 alternating with its lobes. Anthers 2-celled, the cells opening longitudinally and usually parallel. Ovary not lobed or only shortly 4-lobed, usually more or less perfectly divided into 2 or 4 cells or half-cells, with 1 ovule in each cell or half-cell, either anatropous and erect from the base, or more or less amphitropous and attached laterally or near the top so as to appear pendulous. Style terminal, simple entire or more frequently with 2 short stigmatic lobes. Fruit dry or more or less drupaceous, the whole fruit or the endocarp separating into 2 or 4 nuts or pyrenes or quite indehiscent and 2 or 4-celled, and sometimes with an additional central cavity between the carpels having the appearance of a third or fifth empty cell. Seeds solitary in each cell, half-cell or pyrene, erect with or without albumen, the testa usually membranous. Embryo straight, with thick cotyledons and an inferior radicle. Herbs, shrubs, trees or woody climbers. Leaves opposite whorled or rarely alternate, without stipules, entire toothed or divided. Inflorescence various.

Fruit or drupe.
- Lower lobe of the corol much longer than the 4 other, tube short.
  - Flowers small, leaves compound ... ... VITEX.
  - Flowers showy, leaves simple... ... ... GMELINA.
- Corol lobes nearly equal.
  - Corol small usually 4-lobed.
    - Cymes or panicles terminal, style acutely 2-lobed ... ... PREMNA.
    - Cymes axillary, style dilated and truncate at the top ... ... CALLICARPA.
  - Corol 5-6 lobed.
    - Corol tube slender, stamens 4 ... ... CLERODENDRON.
    - Corol tube short, stamens 5-6 ... ... TECTONA.

Fruit a 2-valved capsule ... ... AVICENNIA.

This Order yields the Teak tree, TECTONA GRANDIS, *and* 3 *other valuable timber trees,* VITEX ALTISSIMA *and* PUBESCENS *and* GMELINA ARBOREA. *Of less important trees it gives us another Vitex,* (V. LEUCOXYLON), *three Premnas* (P. TOMENTOSA, SERRATIFOLIA *and* LATIFOLIA), *and one Callicarpa* (C. LANATA), *making a total of* 9 *trees. Of shrubs it yields* 10, *viz.* 2 *species of Vitex,* 1 *of Gmelina,* 3 *of Premna,* 3 *of Clerodendron, and* 1 *of Avicennia. Of scandent plants, undershrubs or herbs not coming under the scope of this Flora there are* 3 *Clerodendrons,* 1 *Congea,* 1 *Symphorema,* 2 *Boucheas,* 1 *Lantana,* 1 *Lippia,* 3 *Premnas and* 1 *Priva.*

VITEX. LINN.

For Gen. Char. see letter-press to Plate cclii.

1. VITEX ALTISSIMA, *L.*—For description, &c. see Pl. cclii.

2. VITEX PUBESCENS, *Vahl.*—A large tree, young branches 4-sided, channelled, and with the petioles and young leaves pubescent or slightly tomentose, leaves 3-5 foliate, petioles 2-4 inches long, leaflets 4-9 inches long by 2½-3 inches broad, elliptic or ovate oblong attenuato-acuminate, rounded at the base subsessile coriaceous penniveined glabrous, shining above, pale finely puberulous beneath, panicles finely villous terminal compound ovato-pyramidal compact, cymes interspersed with foliaceous bracts longer than the calyx, calyx cyathiform sinuately 5-toothed 2½ lines long, corol twice the length of the calyx inflated, inferior lip straightish villous at the base, branches oblong acuminate, drupe globose size of a pea. *DC. Prod.* xi. 685 ;—*Wight Icones.* 1465. Vitex arborea, *Roxb. Fl. Ind.* iii. *p.* 73.

This tree is found throughout our western forests and on our eastern mountains, but it is very much rarer than V. altissima ; it is not uncommon about the foot of the Travancore ghats and on the Tinnevelly mountains at no great elevation ; it also inhabits Eastern Bengal, Birmah, Penang, Sumatra and Java. The timber is of a chocolate color, very hard and durable, and is in use for various purposes ; the tree is called Nowli eragu (Telugu) in the Northern Circars.

3. VITEX LEUCOXYLON, *Linn. fil.*—A large tree, bark soft spongy, young shoots round and smooth often pruinose, leaves opposite on petioles 2-5 inches long, 3-5 foliate, leaflets on petiolules ½ to 1 inch long, oblong or lanceolate generally entire ; sub-coriaceous glabrous and shining above, pale and glabrous or finely puberulous beneath, penniveined, 2-6 inches long by 1-3 inches broad, cymes axillary long peduncled corymbose divaricato-dichotomous, many-flowered, flowers fragrant of a whitish color with the centre of the lower lip violet, calyx patelliform 5-toothed, corol twice the length of the calyx, inferior lip spreading densely hairy, bracts very minute caducous drupe oval smooth shining black, pulp soft black, nut oblong compressed somewhat furrowed. *Linn. fil. Supp.* i. 293 ; —*Roxb. Fl. Ind.* iii. *p.* 74. Wallrothia leucoxylon, *Roth.* Vitex bombacifolia, *Wall.* Vitex saligna, *Roxb. Fl. Ind.* iii. 75.

This tree is sparingly distributed throughout the presidency and Bombay, generally on the banks of streams or rivers ; it is also found in Ceylon, Eastern Bengal and Birmah. In South Canara and part of the Mysore country it is called Hola-nakee (Canarese) ; it ascends the mountains to a little above 3000 feet. The wood is whitish and compact and deserves attention for furniture, and is in use for cart-wheels and various other purposes with the natives ; a cubic foot weighs 42 lbs.

4. VITEX NEGUNDO, *Linn.*—A large erect shrub or small tree with a trunk about 3 feet in girth, the branches, underside of the leaves and inflorescence mealy white, leaves opposite 3-5 foliate, leaflets entire or toothed lanceolate or oblong glabrous or nearly so above, the central one 2-4 inches long, the 2 lower ones smaller and sessile ; flowers small in close opposite cymes forming simple or branched spike-like panicles or rarely the cymes become loosely dichotomous, flowers from white with only a tinge of pink to bluish purple, calyx tomentose not above 1 line long, corol much longer, usually tomentose outside and hairy at the base of the lower lobe. *Linn. Sp. p.* 890 ;—*DC. Prod.* xi. 683 ;—*Wight Icones tab.* 519. V. bicolor, *DC. l. c. p.* 683. V. incisa, *DC. l. c. p.* 684.

This shrub or small tree is common throughout the presidency and Ceylon, generally on the banks of rivers, up to 3000 feet elevation ; it is also found in Bengal, Birmah, the Mauritius, Manilla, Japan, Australia and Hong Kong. It is called Nisinda and Nengar in Hindostanee, and Veyala in Telugu ; the root is bitter and used as a febrifuge, and the leaves bruised are applied to the temples to cure headache.

5. VITEX TRIFOLIA, *Linn.*—A shrub or small tree, the branches, underside of the leaves, and inflorescence mealy-white, leaves 3-5 (rarely 1-) foliate, leaflets sessile or stalked ovate oblong or obovate entire, 1-1½ inches long glabrous or nearly so on the upper side, flowers nearly white or pale blue in small nearly sessile opposite cymes forming short terminal panicles either simple and spike-like or slightly branched, the floral leaves reduced to short bracts. Calyx about 2 lines long very shortly 5-toothed ; corol-tube nearly twice as long as the calyx, the 4 upper lobes short the lowest twice as large and often as long as the tube, and both calyx and corol more or less mealy outside, ovary 2-celled with 2 ovules in each cell, drupe globular smooth black size of a pea. *Linn. Suppl.* 293 ;—*Roxb. Fl. Ind.* iii. *p.*

This is common (chiefly maritime) throughout India and Ceylon, also in Birmah, the Mauritius, Sumatra, Timor, China, Japan, and Australia. The leaves are a powerful discutient ; it has the same native names as the last species.

GMELINA. LINN.

For Gen. Char. see letter-press to Pl. ccliii.

1. GMELINA ARBOREA, *Roxb.*—For description, &c. see Pl. ccliii.

2. GMELINA ASIATICA, *Linn.*—A large shrub, thorny or unarmed, thorns when present axillary opposite horizontal leaf-bearing, leaves petioled broad-oval or obcordate often irregularly lobed, glabrous and shining on both sides or glaucous beneath, 1-1½ inches long by about 1 inch broad, racemes axillary and terminal tomentose, flowers large (1½ inches long) yellow drooping, bracts foliaceous lanceolate cuspidate concave caducous, calyx shortly 4-toothed furnished with discoid glands in front, corol with the lower lip larger than the others, drupe about the size of a filbert. *Linn. Sp. p.* 873 ;*DC.—Prod.* xi. 679 ;—*Roxb. Fl. Ind.* iii. 87. G. parvifolia, *Roxb. Fl. Ind.* iii. 87.

A common shrub throughout India and Ceylon up to 3000 feet elevation, also found in the Philippines; it is only used as fuel; it is called Gumudu in Telugu and Gattademmata in Ceylon.

PREMNA. LINN.

For Gen. Char. see letter-press to Pl. ccli.

1. PREMNA TOMENTOSA, *Willd.*—For description, &c. see Pl. ccli.

2. PREMNA SERRATIFOLIA, *Linn.*—A small tree, the trunk and older branches armed with opposite spines, branchlets panicles and petioles pubescent or glabrous, leaves short petioled ovate or oval-oblong, 2-4 inches long obtuse or acuminate, rounded towards the base, entire or with a few coarse obtuse teeth, quite glabrous in age, flowers small greenish yellow in dense terminal trichotomous cymes or corymbose panicles, slightly viscid and emitting a heavy disagreeable smell, calyx truncate or somewhat bilabiate, tube of the corol twice as long as the calyx, stamens slightly exserted. *Linn. Mant.* ii. *p.* 253. P. integrifolia, *Linn. l. c.* ; *DC. Prod.* xi. 632 ; *Wight Icones tab.* 1469.

Common throughout the plains of India, generally near the coast, also in Ceylon and Malacca ; wood used as firewood and for various purposes by the natives ; called Middee in Ceylon ; the root is used medicinally.

3. PREMNA LATIFOLIA, *Roxb.*—A small tree, leaves subcoriaceous round-cordate or oval entire or obsoletely repand obtuse or slightly acute, a little downy or glabrous in age except the veins, pale beneath, generally about 2½ inches each way, petioles round ½ to 1 inch long, panicles corymbose axillary and terminal many-flowered, flowers dirty-yellow, bracts minute caducous, calyx campanulate unequally 5-toothed, corol throat wooly, upper lip 3-cleft the under one emarginate, anthers bluish scarcely exserted, drupe size of a pea. *Roxb. Fl. Ind.* iii. 76 ;—*DC. Prod.* xi. *p.* 635.

Not uncommon throughout the peninsula and in Ceylon, generally near the coast ; called in Telugu Pedda nella kura, and in Ceylon Middee ; it is perhaps only a variety of the last species. The wood is white and firm and used for various purposes ; the leaves, which have a strong but not disagreeable smell, are much used in curries by the natives.

4. PREMNA CORDIFOLIA, *Roxb.*—A shrub about 6 feet high, branchlets cymes and petioles of the younger leaves villous, leaves short petioled cordate or cordato-ovate acuminate entire bullate, glabrous on both sides, shining above dull and pale beneath, 3-6 inches long, panicles terminal small contracted corymbose, flowers greenish-yellow, calyx cup-shaped 2-lipped both lips roundish entire, corol bilabiate about the length of the calyx-tube, upper lip rounded entire concave, lower 3-lobed, the middle lobe larger, throat densely villous, stamens and style about as long as the corol, drupe the size of a pea. *Roxb. Fl. Ind.* iii. 78 ;—*Wight Icones tab.* 1483.

Coimbatore, Madura, S. Arcot, and elsewhere in the plains of the peninsula.

5. PREMNA GLABERRIMA, *Wight.*—A shrub 5-6 feet high, everywhere glabrous except the inflorescence, leaves petioled ovate oblong or obovate abruptly acuminate entire or toothed membranaceous or subcoriaceous, somewhat shining above, pale whitish beneath, up to 8 inches long by 2½ broad, panicles terminal lax corymbose, ultimate divisions dichotomously cymose, calyx campanulate

obscurely 5-toothed shortly villous, corol bilabiate, upper lip emarginate, under 3-lobed, middle lobe the largest, throat hairy, stamens didynamous the larger pair exserted, style length of the longer stamens subclavate 2-cleft at the apex. *Wight Icones tab.* 1484.

Tinnevelly mountains ; the leaves are often serrated.

6. PREMNA WIGHTIANA, *Schauer.*—A large shrub or small tree, branchlets, cymes and petioles pubescent, leaves petioled ovate abruptly acuminate rounded or slightly attenuated at the base, entire or shortly toothed anteriorly, sub-bullate, glabrous on both sides membranaceous, about 3 inches long, panicles terminal thyrsoid, calyx sub-bilabiate unequally 5-toothed, tube of the bilabiate corol twice the length of the calyx, throat closed with hairs, putamen of the drupe pear-shaped verrucoso-tuberculate. *DC. Prod.* xi. 635 ;—*Wight Icones tab.* 1485.

Common about the southern parts of the peninsula up to about 3000 feet elevation.

7. PREMNA PURPURASCENS, *Thw.*—A scandent species (Anamallays, Wynaad, Ceylon.)—8. PREMNA HERBACEA, a small medicinal herb (Mudumallay, Travancore (Cardamom Hills), Ceylon).—9. PREMNA PROCUMBENS, an undershrub (Ceylon).

CALLICARPA. LINN.

Gen. Char. Calyx truncate or 4-rarely 5-toothed. Corolla with a short tube, the limb spreading, of 4, rarely 5 lobes, nearly equal. Stamens 4, rarely 5, shortly exserted. Ovary 4-celled with 1 ovule in each cell, laterally attached at or above the middle ; style filiform, dilated and truncate or very shortly 2-lobed. Fruit a small succulent drupe, the endocarp of 4 distinct 1-seeded nuts or pyrenes. Seed without albumen. Trees or shrubs, more or less cottony or woolly with stellate hairs or rarely glabrous, and often with numerous resinous glandular dots, especially on the under side of the leaves. Leaves opposite, undivided. Flowers small, in axillary cymes, with very small bracts.

1. CALLICARPA LANATA, *Linn.*—A middling sized tree, all the young parts more or less mealy, young shoots bluntly 4-sided or nearly terete, leaves opposite ovate oval or elliptic with a long acumination entire or slightly serrated, more or less downy underneath with a dense white tomentum above, sometimes nearly glabrous in age except the veins, 9-15 inches long by 4-6 broad, petioles 2-3 inches long, corymbs axillary erect 2-forked throughout, more or less covered with downy farina, bracts small purple or red, calyx truncate short quite entire or more or less 4-toothed, corol twice as long as the calyx. *Linn. Sp. Pl. ed. Willd.* i. 620 ;—*Roxb. Fl. Ind.* i. 391. Tomex tomentosa, *Fl. Zey.* 59. C. Wallichiana, *Walps. Rep.* iv. 125 ;—*DC. Prod.* xi. 641.

This tree is common in hill forests throughout the presidency and in Ceylon up to 4000 feet elevation ; its wood is white and spongy and of no use. The leaves are entire and slightly serrated on the same tree. We have, I believe, only one species though it differs much in the amount of the mealy pubescence and shape of the leaves ; one variety from the Orissa mountains (Russelcondah) has much less pubescence than the southern forms, and the leaves are quite elliptic, tapering equally at both ends (6-8 inches long, without the petiole, by 3-4 broad.)

Analysis, Pl. XXI, fig. 6.

(Under Walper's name Wallichiana, which should be corrected to C. lanata, *L.*)

1. A small portion of a corymb.
2. A flower bud.
3. A full flower.
4. A flower opened.
5. Calyx opened, ovary, style and stigma.
6. An anther, front view.
7. An anther, back view.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. Portion of a corymb in fruit. (Drawn from dried specimens collected on the Pulney Hills ; the calyx is much more toothed than usual, it is generally truncate and quite entire).

CLERODENDRON. LINN.

Gen. Char. Calyx campanulate or inflated, 5-toothed or 5-lobed, generally enlarged and spreading under the fruit. Corolla-tube slender, often very long ; limb spreading, nearly equally 5-lobed. Stamens 4, exserted and often very long. Ovary 4-celled, with 1 ovule in each cell, laterally attached at or above the middle. Style filiform, with 2 short acute stigmatic lobes. Fruit a more or less succulent or almost dry drupe, the endocarp separating into 4 one-celled or rarely into 2 two-celled pyrenes. Trees or shrubs or rarely herbs or woody climbers. Leaves opposite or in whorls. Flowers in loose heads or cymes, usually forming terminal corymbose or thyrsoid panicles, or rarely axillary.

1. CLERODENDRON INFORTUNATUM, *L.*—A large shrub, branchlets quadrangular and like the branches of the panicles, petioles and nerves of the leaves whitish strigoso-tomentose, leaves long petioled roundish or ovato-cordate, or the upper ones ovate or even attenuated at the base not at all cordate, entire or shortly and sharply toothed, strigose on both sides ; panicles terminal spreading large naked, cymes laxly flowered, bracteoles caducous, flowers white, calyx strigoso-pubescent 5-nerved ventricose at the base squamato-glandulose 5-parted, segments lanceolate slenderly acuminate, corol strigoso-villous and glanduloso-punctate many times longer than the tube of the calyx, segments of the limb sub-unguiculate sub-recurved 3 times shorter than the tube, berries purple. *Linn. Fl. Zey. p.* 232 ;—*DC. Prod.* xv. 667 ;—*Wight Icones tab.* 1471.

A common shrub or undershrub found throughout India and Ceylon up to 5-6000 feet elevation, also in Birmah and Penang; in Ceylon it is called Gas-pinna.

Analysis, Pl. XXII, fig. 1.

1. Portion of the inflorescence.
2. A corol opened, shewing the insertion of the stamens.
3. Calyx opened, shewing ovary, style and stigma.
4. Anthers, front and back view.
5. Ovary cut vertically.
6. Ovary cut transversely.

2. CLERODENDRON PHLOMOIDES, *Linn.*—A shrub 6-10 feet in height, branchlets terete and like the petioles and peduncles whitish tomentose, leaves membranaceous opposite petioled ovate or ovato-rhomboid acuminate somewhat obtuse entire at both ends, irregularly and bluntly serrated in the middle, glabrous above puberulous beneath, panicles terminal large fastigiate leafy below, cymes trichotomous lax, bracteoles oblong, flowers white, calyx glabrous campanulato-ventricose half 5-cleft, segments subovate acute, tube of the corol subglandulose thrice the length of the calyx. *Linn. Suppl. p.* 292 ;—*DC. Prod.* xv. 663 ;—*Wight Icones tab.* 1473.

A common shrub all over the peninsula.

3. CLERODENDRON INERME, *Br.*—A glabrous shrub, or when young slightly pubescent, leaves stalked ovate obtuse or shortly acuminate entire, 1-3 inches long, preduncles axillary often nearly as long as the leaves, bearing 3 pedicellate flowers, calyx truncate not 2 lines long when in flower, above 3 when in fruit, corol-tube slender about 1 inch long, lobes about 4 lines, stamens much longer, drupe ovoid about twice as long as the calyx. *DC. Prod.* xi. 660.

A common shrub throughout India along the sea coasts, also in the Archipelago and the Islands of the Pacific; called in Ceylon Wall gooranda.

4. CLERODENDRON SERRATUM, *Spr.* ; 5. C. SIPHONANTHUS, *R. Br.*, are undershrubs found in our forests ; and 6. C. LINNÆI, *Thw.*, is a scandent species found in Ceylon.

TECTONA. LINN.

For Gen. Char. see letter-press to Pl. ccl.

1. TECTONA GRANDIS, *L.*—For description, &c. see Pl. ccl.

AVICENNIA. LINN.

Gen. Char. Calyx divided to the base into 5 distinct segments or sepals. Corolla-tube short and broad ; limb of 4 nearly equal spreading lobes or the upper one rather larger. Stamens 4, inserted in the throat, with the anthers slightly protruding. Ovary 1-celled, with 4 ovules collaterally suspended from a central column, which has 4 angles between the ovules, imperfectly dividing the ovary into 4 cells. Fruit a compressed capsule, the pericarp opening in 2 valves. Seed solitary, erect, without integuments, (the integuments of the ovule not developed) ; embryo with 2 very large cotyledons folded longitudinally, a very hairy radicle, and a prominent plumula, which germinates before the fruit drops off as in *Rhizophora*, &c. Shrubs, leaves opposite, undivided. Flowers in small cymes in the upper axils or in terminal panicles. *Linn.* ;—*Benth. Fl. Aust.* v. *p.* 69.

1. AVICENNIA OFFICINALIS, *Linn.*—An erect shrub, varying much in height, the branches, inflorescence and underside of the leaves white or silvery with a very close tomentum, more silky on the flowers, the upper side of the leaves usually glabrous when full grown, black and shining when dry. Leaves coriaceous, usually lanceolate or ovate-lanceolate, 2 to 3 inches long, acute and contracted into a petiole, but varying to elliptical or obovate and very obtuse. Cymes contracted into small heads on rigid angular peduncles, which are often 2 together in the upper axils or several in a small terminal leafy thyrsus. Bracts shorter than the sepals. Sepals orbicular or broadly ovate, concave, hirsute and ciliate, about 1¼ line long. Corolla-tube shorter than the sepals, lobes ovate rather longer than the tube, the upper inner one rather larger than the others. Ovary very hairy.—A. tomentosa, *Jacq.* ;—*R. Br. Prod.* 518 ; *Schau. in DC. Prod.* xi. 699 ;—*Wall. Pl. As. Rar. t.* 271 ;—*Wight Ic. t.* 1481 ;—*Benth. Fl. Aust.* v. 70.

This small tree or shrub is met with in the tidal backwaters near the coast throughout India and in Africa, America and Australia ; the bark is used for tanning. A preparation made from the ashes of its wood is used by dhobies for washing cotton cloths, and by painters to mix with their colors to make them adhere.

Analysis, Pl. XXII, fig. 2.

1. A flower.
2. Corol open, shewing the 4 stamens.
3. A stamen.
4. Ovary, style and stigma.
5. Transverse section of the ovary.
6. Vertical section of the ovary 1-celled, with 4 ovules collaterally suspended from a central column. (Drawn from dried specimens.)

SUB CLASS III—MONOCHLAMYDEÆ.

ORDER LX—NYCTAGINEÆ.

Perianth simple, inferior, the lower portion persistent and enclosing the ovary and fruit, the upper portion variously shaped, with 5 rarely 4 angles, folds, teeth or lobes, deciduous or withering. Stamens either of the same number as the folds or teeth of the perianth or fewer or more, often inconstant in the same species, and never more than 20, inserted on (or united at the base with) a narrow or cupshaped disk more or less adnate to the stipes of the ovary within the perianth (or rarely free from the base ?); filaments slender usually exserted; anthers 2-celled, the cells attached back to back and opening longitudinally round the outer margin. Ovary shortly stipitate within the base of the perianth, 1-celled, with 1 erect anatropous ovule. Style terminal, simple, undivided, with a single stigma. Fruit 1-seeded, enclosed in the persistent tough or hardened base of the perianth which falls off with it, having the appearance of a pericarp, the real pericarp thin and membranous more or less adherent to and often inseparable from the equally thin testa of the seed. Embryo curved transversely folded or longitudinally convolute around or within a mealy albumen, radicle inferior. Herbs, shrubs or trees, the nodes often tumid and articulated. Leaves usually opposite, often unequal in each pair, rarely alternate, usually entire or scarcely sinuate. Flowers solitary clustered or umbellate, the bracts often forming an involucre round them, sometimes large and coloured, but often small.

An order of no importance to the forester. Besides the Pisonia aculeata, a climbing or straggling shrub, it is only represented in S. India by the genus Boerhaavia. which yields 2 or 3 small herbaceous plants. Of introduced plants Pisonia morindifolia (the Lettuce tree) and the beautiful Bugainvilleas (creepers), and the Mirabilis (Marvel of Peru) are common in our gardens.

PISONIA. Linn.

Gen. Char. Flowers hermaphrodite or unisexual. Perianth in the hermaphrodite flowers contracted above the ovary, in the males campanulate, in the females ovoid or cylindrical, the margin in all 5-angled or 5-toothed. Stamens usually 6 to 8 longer than the perianth, none in the female flowers. Ovary entirely wanting or imperfect in the male flowers Stigma in the females dilated, oblique. Fruiting perianth oblong or elongated, 5-ribbed, smooth or glandular-muricate, crowned by the small withered limb of the perianth. Seed oblong with a deep longitudinal furrow. Albumen scanty. Embryo straight, the cotyledons convolute over the intruded testa. Trees, shrubs or woody climbers. Leaves opposite or scattered. Flowers in dense or loose cymes, often arranged in terminal panicles. Bracts and bracteoles very small or none.

1. Pisonia aculeata, *Linn.*—A tall woody climber, forming impenetrable masses on the borders of forests reduced to a low straggling bush in open places, glabrous or rarely pubescent; often armed with stout recurved axillary prickles (abortive peduncles). Leaves opposite or here and there alternate, petiolate, ovate, often broad, or rarely oblong or lanceolate obtuse, entire, rarely exceeding 3 inches and often all under 2 inches long. Flowers diœcious, in small dense cymes or globular clusters, of which several are usually collected into small panicles in the upper axils, the common peduncle rarely exceeding the leaves and often very short. Male perianths shortly pedicellate, campanulate, shortly and broadly 5-toothed, the bud clavate and prominently 4-angled at the top, opening to about 2 lines diameter. Female perianths nearly sessile, ovoid, about 1 line long, obscurely 5-toothed, enclosing the ovary, the style shortly protruding, with a deeply lobed or fringed stigma. Fruit in loose cymes forming often large panicles, the pedicels lengthening to above ½ inch, the enlarged perianth oblong or linear-clavate, ¼ to ½ inch long, 5-ribbed, glandular muricate. *Wight Ic. t.* 1763, 1764. P. villosa, *Poir.*;—*Chois. in DC. Prod.* xiii. 11. 440, P. limonella, *Blume*;—*Chois. l. c.* 446;—*Benth. Fl. Aust.* v. 279.

A common shrub throughout India and Ceylon up to 3000 feet elevation; it is also found throughout the tropical regions of the new and old world.

Analysis, Pl. XXII, fig. 3.

1. A male flower bud.
2, 3. Full male flowers.
4. The calyx of male flower,
5. Anther, front view.
6. Anther, back view.
7. Stamens and abortive ovary.
8, 9. Abortive ovary cut vertically and horizontally.
10. A female flower.
11. Female flower, opened disk, ovary, style and 3-cleft stigma.
12. Ovary cut vertically, 1 cell, 1 erect ovule.
13. Ovary cut transversely.
14. Fruit.
15. Fruit opened, exposing the seed.
16. Vertical section of seed, the cotyledons convolute over the intruded testa.
17. The embryo removed. (Drawn from living flowers.)

ORDER LXI—MYRISTICEÆ.

Flowers diœcious, regular. Perianth deciduous, 3-lobed or rarely 2 or 4-lobed, the lobes valvate in the bud. Male flower: Stamens united in a central column, anthers 3, 6, or more adnate to the column at the apex, or in a ring immediately below the column, each with 2 parallel cells opening longitudinally. Female flower: Ovary free within the perianth, with a single erect anatropous ovule; stigma sessile or nearly so, capitate or depressed. Fruit succulent, opening tardily in 2 valves. Seed erect, sessile, more or less covered with a lobed or jagged often scarlet arillus (arillodium) proceeding from the base of the seed. Albumen remarkably ruminate. Embryo very small, at the base of the seed, with divaricate cotyledons. Trees, often aromatic. Leaves alternate, entire, usually

dotted, penniveined, without stipules. Flowers small, in axillary or supra-axillary racemes or panicles, more numerous in the males than in the females. Bracts minute or none.

This order is limited to the genus Myristica (which yields the Nutmeg of commerce.) In this presidency we have 5 species, all large trees, confined to our moist western forests; all of these I have figured. A 6th species, M. ATTENUATA, *inhabits the Bombay ghats, and will probably also be found in Canara and Mysore; and 2 others,* M. HORSFIELDIA *and* M. IRYA, *are found in Ceylon. The timber of several of our Indian species appears to be of fine quality, but it has never been tried. The order should receive the attention of forest officers.* MYRISTICA MOSCHATA *(the true nutmeg) is very common in cultivation on the west side of the Presidency and on the Tinnevelly mountains.*

MYRISTICA. LINN.

Gen. Char. the same as that of the order.

1. MYRISTICA LAURIFOLIA, *H. f. et T.*—For description, &c. see Pl. cclxvii.

2. MYRISTICA MAGNIFICA, *Bedd.*—For description, &c. see Pl cclxviii.

3. MYRISTICA MALABARICA, *Linn.*—For description, &c. see Pl. cclxix.

4. MYRISTICA FARQUHARIANA, *Wall.*—For description, &c. see Pl. cclxx.

5. MYRISTICA CORTICOSA, *Lour.*—For description, &c. see Pl. cclxxi.

6. MYRISTICA ATTENUATA, *Wall.*—A tall tree, branches slightly scurfy, leaves membranaceous oblongo-lanceolate long attenuated, acute or rounded at the base, sub furfuraceous on the costa and veins, glabrescent in age, glaucous beneath, 5-8 inches long by $1\frac{3}{4}$-$2\frac{3}{4}$ inches broad; the lateral veins 12-20 on each side, petioles 5-6 lines long, peduncles axillary 3-4 flowered, pedicels longer than the peduncle bracteolate at the apex, perianth subglobose laxly tomentose, antheriferous disk flat surrounded by 12 anthers, fruit oval or oblong fulvo-tomentose, $1\frac{1}{2}$ inch long, aril thin. *Wall. List.* 6791;—*H. f. et T. Fl. Ind. p.* 157.

On the Concan ghats in Bombay. The section *Knema*, to which this and M. corticosa belong, is well distinguished from the rest of the genus (except M. Irya, in which the disk is concave) by the staminal column being dilated at the apex into a flat disk round which the anthers are placed; it is made a separate genus by some. I have not seen this species, and it is perhaps not distinct from No. 5

7. MYRISTICA HORSFIELDII, *Bl.*—A very large tree, young branches densely tomentose, young parts floccoso-tomentose, leaves ovato-oblong acuminate, glabrous above, beneath stellato-pubescent, 6-9 inches long by $2\frac{1}{3}$-$3\frac{1}{2}$ inches broad, panicles axillary the male 3-6 inches long branched, the branches alternate bearing 3-5 subsessile heads, the female generally much shorter simple densely furfuraceo-tomentose, flowers very fragrant; *the male* densely glomerate sessile obconical, perianth 3-4 parted, anthers 6 adnate to the slender column which is clavate at the apex, the connective not produced beyond the apex; *the female* lax subsessile swollen at the base, ovary tomentose, stigma sessile undivided, fruit ovoid ferrugineo-tomentose, aril fleshy complete undivided. *Bl. Bijd.* 577;—*H. fil. et T. Flora Ind.* 163. Pyrrhosia Horsfieldii, *Wight Icones tab.* 1857. Myristica Iryaghedhi, *Gærtn.* i. *t.* 41, *exparte.* Horsfieldia odorata, *Willd. Sp.* iv. 872. M. Iriagedi, *Spr. Syst. fig.* iii. 65. M. ferruginea, *Wall. cat.* 6803.

Ceylon, abundant in the Ambagamwa and Ratnapoora districts up to 1000 feet elevation, called Rook; the fragrant flowers are used by the natives as a perfume for scenting their clothes.

8. MYRISTICA IRYA, *Gærtn.*—A large tree, young parts slightly puberulous, leaves variable in form, oblong or linear-oblong rounded or acute at the base, glabrous on both sides, 5-10 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, petiole $\frac{1}{3}$-$\frac{2}{3}$ inch long, panicles from the old axils much branched 3-6 inches long, bracts ovate glanduloso-punctate deciduous, flowers minute glabrous, perianth 2-3 parted glabrous, staminal column pyriform concave at the apex antheriferous round the margin, anthers 6-8. Stigma depressed entire or scarcely lobate, fruit globose nearly 1 inch in diameter granuloso-tuberculate but glabrous, valves thick coriaceous reddish and glabrous on the inside, aril complete thin fleshy scarlet, seed globose, hilum small. *Gærtn. Fruct* i. 195. *t.* 41;—*H. f. et T. Fl. Ind.* 159. M. Javanica, *Bl. Bijd.* 576. M. sphærocarpa, *Wall. Pl. As. Rar.* i. *t.* 89. M. exaltata, *Wall. cat.* 6804 *partim.*

Ceylon, common in damp places up to 2000 feet elevation, called Irya; also found in Birmah, Java and Borneo. This belongs to the section *Irya*, distinguished by its staminal column being dilated into a concave disk.

ORDER LXII—MONIMIACEÆ.

Perianth regular, usually at first globular or nearly so and more or less adnate to or continuous with the expanded receptacle or staminal disk, the limb of 4 or more connivent lobes or segments in 2 or rarely more rows, but all of similar texture, calycine or scarcely petaloid, deciduous or persistent. Stamens either definite and opposite the perianth-segments or more frequently indefinite and irregularly arranged in several rows; filaments very short; anthers adnate, usually extrorse, the cells opening in separate valves or in longitudinal slits, either distinct or confluent at the apex. Gynæcium of several carpels free and distinct rarely reduced to a single one, each with a single ascending or pendulous antropous ovule, style terminal usually oblique excentrical or almost lateral, filiform or very short or almost none, with a small or pulvinate terminal stigma. Fruit of several (or rarely only one) 1-seeded drupes or nuts, resting on the expanded receptacle or persistent portion of the perianth-tube or enclosed in the enlarged perianth. Seed with a membranous testa and fleshy albumen. Embryo usually very small, with divaricate or appressed cotyledons and a short or long radicle next the hilum. Trees, shrubs or woody climbers, usually glandular-dotted and aromatic. Leaves opposite entire or toothed, without stipules. Flowers solitary or in trichotomous cymes or definite raceme-like or thyrsoid panicles, axillary or rarely terminal. Bracts usually very small.

This order is only represented by the genus Hortonia, which yields a shrub or small tree only as yet detected in Ceylon.

HORTONIA. WIGHT.

Gen. Char. Flowers hermathrodite or polygamous, sepals about 30 in many series imbricate slightly cohering at the base, the exterior ones thickish rounded, the interior longer and thinner, the innermost ligulate acute. Stamens 7-10 in a single series at the margin of the torus, filaments cylindrical furnished at the base with 2 large cucullate stipitate glands, anthers extrorse adnate broadly oval 2-celled, dehiscing longitudinally, ovaries few or indefinite oblong or ovoid-oblong attenuated into a simple style, stigma dilated, ovule solitary pendulous, drupe obovoid compressed attenuated into a stipe at the base, putamen smooth fragile, seed pendulous, testa thin, chalaza large basal, raphe marginal conspicuous, albumen copious fleshy, embryo minute included in the albumen, cotyledons oval obtuse divaricate, radicle superior. Shrubs or small trees, leaves opposite entire, inflorescence cymose axillary, flowers yellowish. *Wight et Arnt. in Ann. Zool. Bot.* 2 *p.* 545.

1. HORTONIA FLORIBUNDA, *Wight.*—A small tree or shrub, young parts stellately puberulous, leaves petioled from oval obtuse to oblongo or ovato or linear-lanceolate acuminate coriaceous entire penniveined glabrous, 3-7 inches long by ½-2½ broad, petioles ½-⅔ inch long, peduncles axillary 1-3 inches long cymose, few flowered, flowers rarely reduced to only 1, pale yellowish green very variable in size, sometimes polygamous, exterior leaves of the perianth and pedicels minutely stellato-puberulous. *Wight. l. c.* Hortonia floribunda, ovalifolia et acuminata, *Wight Icones. tab.* 1997, 1998.

Ceylon, from the sea level up to 6000 feet, called Waaweya; a very variable plant. The lower level form (common at Badagam) has narrower leaves and much smaller flowers, and is sometimes polygamous with very small effete ovaries.

Analysis, Pl. XXV, fig. 3.

1. Branch in flower.
2. Flower, underneath view.
3. Flower, front view.
4. A stamen and the glands. (Drawn from flowers in spirits collected near Galle in Ceylon.
5. Ovaries.
6. An ovary removed.
7. Vertical section of ovary.
8. Branch of fruit.

9—11. Analysis of fruit, seed and embryo. (From drawings communicated by Dr. Thwaites.)

ORDER LXIII—PROTEACEÆ.

Flowers hermaphrodite or rarely partially unisexual. Perianth regular or irregular, deciduous, consisting of 4 segments valvately united in the bud, the claws forming a tube cylindrical or dilated towards the base, the laminæ short, forming a globular ovoid or rarely elongated limb; the segments at length separating either from the base upwards or revolute from the lamina downwards, leaving a portion of the tube entire or open on one side, the laminæ sometimes cohering long after the segments have separated lower down. Stamens 4, opposite the perianth-segments and usually inserted on them, either with the filaments wholly adnate leaving the anthers sessile at the base of the laminæ, or the filaments shortly free below the laminæ, or very rarely the stamens entirely free from the perianth; anthers various all perfect or rarely partially abortive, most frequently with 2 parallel cells adnate to a connectivum continuous with the filament. Hypogynous or perigynous glands or scales in many genera 4, alternating with the stamens, but in some genera variously united or reduced in number or wholly deficient. Ovary 1-celled, sessile or stipitate, more or less excentrical, with a single terminal undivided style variously shaped at the end, with a small terminal oblique or lateral stigma. Ovules either solitary or 2 collaterally attached or slightly superposed, or several imbricate in 2 contiguous rows, either pendulous and orthotropous, or more frequently laterally attached and more or less amphitropous, rarely erect and anatropous, the micropyle always inferior and frequently prominent from the incomplete development of the primine. Fruit either an indehiscent nut or drupe, or a more or less dehiscent coriaceous or woody follicle, very rarely a completely 2-valved capsule; either 1-celled and 1-seeded, or when 2 seeds are ripened in a drupe, sometimes really 2-celled from the growth of the endocarp between as well as round the seeds, or when 2 or more seeds ripen in a follicle, apparently 2-or more-celled by the consolidation of the external coating of the 2 adjoining seeds into a membranous or woody plate detaching itself from the remainder of the seed. Seeds without albumen, the testa usually thin rarely coriaceous or hard; embryo straight, with fleshy cotyledons and a short inferior radicle. Shrubs or trees, rarely undershrubs or even perennial herbs. Leaves alternate or scattered, in a very few genera strictly opposite or verticellate, but often crowded under the inflorescence so as to appear verticellate, usually coriaceous, often vertical with stomata on both sides, or in the same genera horizontal or narrow and terete, entire toothed or variously divided, without stipules. Flowers axillary or terminal, solitary or in racemes or spikes, often condensed into umbels, heads or cones, each flower or pair of flowers subtended by a bract, very deciduous in some genera and perhaps sometimes really deficient.

A very large Australian and South African order, but it is not one of any importance to the Indian forester; the only genus represented in S. India is Helicia, and this yields 2 small trees, one on the Tinnevelly ghats and one in Ceylon, both at elevations between 2000 and 4000 feet, and one shrub (slopes of the Nilgiris, 3-4000 feet.)

Numerous species of Hakea, and several species of Grevillea and Banksia, introductions from Australia, are growing admirably in our gardens at Ootacamund, and I am endeavouring to introduce more plants of this interesting order, as they will probably all thrive well on the Nilgiris. Grevillea robusta and Stenocarpus salignus are thriving well at Madras and Ootacamund (i.e., sea level and 7000 feet), the former of these two is a very valuable introduction as an ornamental tree, and it might be largely planted at most stations. Leucodendron argenteum, the Silver Tree of the Cape, has been introduced and grows well on our mountain ranges, the beautiful Telopea speciossisima (the Waratau of New So th Wales), and the splendid Cape Proteas are desirable introductions for our mountain gardens.

Tribe Grevilleæ.—Ovules 2-4, seeds without any intervening substances or separated by a thin lamina or mealy substance. Flowers in racemes or clusters with deciduous or abortive bracts, or with an involucre of imbricate bracts.

Ovules 2 ascending, perianth regular or nearly so, leaves alternate, fruit with a thick woody indehiscent pericarp or putamen..... HELICIA.

HELICIA. LOUR.

For Gen. Char. see letter-press to Pl. ccci.

1. HELICIA ROBUSTA, *Wall.*—For description, &c. see Pl. ccci.

2. HELICIA NILAGIRICA, *Bedd. Mad. Journ. of Lit. July* 1864 (cum. fig).—A shrub, glabrous, leaves broad ovate elliptic or lanceolate acute attenuated at the base coarsely and sharply dentate with large sinuses except at the very base, prominently veined and reticulated sub-membranaceous, racemes much shorter than the leaves, peduncles very short, each bearing 2 pedicels 3-6 lines in length, a bract at the base of the peduncle and a bracteole on each pedicel near its base, fruit 5 lines in diameter.

Western slopes of the Nilgiris 3-4000 feet elevation abundant. This differs from the last in being only a shrub and in the leaves being petioled and acute at the base and much more membranaceous, the fruit is also much smaller.

3. HELICIA CEYLANICA, *Gardn.*—A middling sized glabrous tree, peduncles and pedicels purplish, leaves rather coriaceous entire oblongo or obovato-elliptic obtuse attenuated into a short petiole, veins prominent on both sides slender laxly reticulated, 4-5 inches long by 1¼-2 inches broad, petioles about ½ an inch long, racemes axillary solitary subsessile about equalling the leaves laxly flowered, pedicels slender 3-4 lines long from a very short peduncle, calyx glabrous 8-9 lines long a little swollen at the base, ovary glabrous, hypogynous glands obtuse semicuneate, flowers pale yellow, fruit ovoid slightly acuminate at both ends, blackish purple about 1 inch long. *Gardn. Calc. Journ. of Bot. vol.* vii. *p.* 453 ;—*DC. Prod.* xiv. *p.* 438 ;—*Thw. En. Pl. Zey. p.* 250.

Ceylon, central provinces, 2000-4000 feet elevation.

ORDER LXIV—THYMELÆACEÆ.

Flowers hermathrodite or rarely unisexual, polygamo-diœcious, 4-or rarely 5-merous. Calyx inferior, corolla-like or rarely herbaceous gamosepalous, tubular, funnel-shaped, campanulate, or urceolate, deciduous or marcescent, tube continuous or articulately breaking above the base with the base persistent in fruit, lobes 4-5 imbricate with often the addition of 1-2 small scales alternating with the lobes at their base connivent or spreading, scales hypogynous, 4-8, small membranaceous fleshy or filiform, placed round the ovary, free or connate into a ring or cup or adnate to the calyx, rarely obsolete or wanting. Stamens 2-4, 4-5 or 8-15, generally in 2 series when double as many as the lobes of the calyx, inserted into the jaws or on the tube, filaments filiform or flat adnate to the tube or throat or base of the lobes, included or exserted, anthers 2-celled oval oblong or linear affixed by the base or back erect or versatile dehiscing longitudinally, ovary free 1-2 celled, ovule 1 solitary pendulous or 2-3 collateral or superposed, style simple lateral or terminal filiform deciduous or often very short or wanting, stigma capitate sphœroid or subclavate, papillose or rarely smooth, fruit indehiscent, nucamentaceous drupaceous or baccaceous, 1-rarely 2-celled, cells 1-rarely 2-3 seeded or (in Gyrinops and Aquilaria only) a capsule opening loculicidally in 2 flat valves with the narrow dissepiment in their centre, seed without or with albumen, embryo straight with a superior radicle. Trees, shrubs or climbers or rarely herbs, leaves simple and entire alternate or opposite without stipules, flowers in terminal or axillary clusters, heads, umbels, racemes or spikes.

Not an order of any importance to the forester ; it is only represented in this Presidency by one large shrub or small tree (Lasiosiphon eriocephalus) which is common on the mountains on the west side of the presidency, and by one climber (Canejera Rheedii). In Ceylon the genera Gyrinops and Phaleria each yield 1 small tree, and Wikstrœmia a shrub ; but these 3 genera have not yet been detected in the peninsula.

In East Bengal the genus AQUILARIA *yields a large tree, and the genus* LINOSTOMA *a shrub, and the genus* DAPHNE *is represented by 5 shrubs in Northern Bengal, the Himalayas, Khasya, Sylhet, &c.*

SUB ORDER THYMELEÆ.—Ovary 1-celled, ovule solitary.

Stamens twice as many as calyx-lobes.	
Calyx 4-lobed	WIKSTRÆMIA.
Calyx 5-lobed	LASIOSIPHON.
Stamens equal in number to calyx-lobes	CANEJERA.

SUB ORDER AQUILARINEÆ.—Ovary 2-celled, cells 1-ovuled (or 1-celled placentas 2 parietal.)

Calyx 5-lobed, anthers sessile	GYRINOPS.
Calyx 4-lobed, anthers with filaments	PHALERIA.

WIKSTRÆMIA. ENDL.

Gen. Char. Calyx or perianth with a spreading 4-lobed limb without scales at the throat, anthers 8 in 2 rows near the top of the tube, perigynous scales none, hypogynous scales 4-5 or 2 small linear free or connate below, ovary 1-celled with 1-pendulous ovule, style terminal short or obsolete, stigma subcapitate, berry drupaceous, seed without albumen. Leaves opposite or alternate, flowers in short terminal or axillary racemes or spikes.

1. WIKSTRÆMIA VIRGATA, *Meisn.*—A shrub with twig-like branches, puberulous or tomentose at the top, leaves alternate herbaceous or subcoriaceous short petioled oblong or lanceolate sparingly adpressedly pilose or subglabrous, peduncles hairy tomentose terminal and from the upper axils shorter than the leaves, flowers shortly pedicellate racemoso-capitate hoary-tomentose, lobes of the calyx very short obtuse, tube 8-striated within, anthers on filaments nearly their own length, ovary stipitate pubescent, hypogynous scales 4-5 more or less connate. *Meisn.* ;—*DC. Prod.* xiv. 547. W. canescens et inamœna, *Meisn.* ;—*DC. l. c.* W. salicifolia, *Decaisne* ;—*DC. l. c.* Daphne inamœna, *Gard. in Calc. Journ. of Nat. Hist.* vii. *p.* 454.

Ceylon, central provinces, 6000-8000 feet elevation.

Analysis, Pl. XXV, fig. 4.

1. A branch in flower.
2. The calyx or perianth opened, lobes very short, tube 8-striated within, anthers on filaments nearly their own length.
3, 4. Stamens, front and back view.
5. Ovary and sessile stigma, and the linear hypogynous glands, 1 free, 4 connate.
6. Ovary cut vertically, shewing the single cell and 1 pendulous ovule (the ovary should be in a longer stipe). From a drawing communicated by Dr. Thwaites.

The genus is generally described as with sessile anthers, and this species as having 4 free hypogynous glands ; in all the flowers I have dissected, I found Dr. Thwaites's analysis correct as to the filaments, and the hypogynous glands are all slightly connate at the base and all but 1 up to the apex.

LASIOSIPHON. Fresen.

Gen. Char. Flowers hermathrodite 5-merous. Calyx or perianth colored pubescent outside, glabrous within, tube slender, limb 5-parted regular spreading. Scales 5-petaloid, inserted into the jaws of the tube at the sinus of the lobes alternate with the upper stamens, exserted glabrous entire or bifid, sometimes obsolete. Stamens 10 in a double row near the apex of the tube subsessile or with short filaments, anthers affixed near the base, linear or oblong obtuse, hypogynous ring membranaceous surrounding the ovary at the base small or obsolete, ovary sessile or stipitate, style equalling the calyx-tube, stigma capitate papillose, fruit included in the persistent base of the calyx. Seed sparingly albuminous. Shrubs or small trees, leaves scattered or opposite, flowers in terminal or subterminal heads usually many-flowered surrounded by a many-leaved involucre, receptacle hemispherical villous.—Enkleia, *Griff. in Calc. Journ. of Nat. Hist.* 4. *n.* 13. Gnidia, *Wight* (not *Linn.*)

1. Lasiosiphon eriocephalus, *Dcne.*—A large shrub or small tree up to 25 feet high, leaves alternate scattered, lanceolate acute to oblong obtuse glabrous, very shortly petioled, 2-3 inches long by ½-1 inch broad, the involucral ones nearly equaling the short peduncled or subsessile capitule, oblong hoary imbricate, calyx 5-10 lines long villous with long white or brown hairs. Scales linear obovate or obcordate. *Decaisne in Jacq. Voy. p.* 148 ;—*DC.* xiv. *p.* 597. L. speciosus, *Dcne. l. c.* ;—*DC.* xiv. 598. L. Metzianus, *Miq.* ; —*DC. l. c.* 598. L. insularis, *DC. l. c.* 598. L. Sisparensis, *DC. l. c.* 598. Gnidia eriocephalus and Sisparensis, *Wight Icones* 1859 & 60. Gnidia insularis, *Gardner* (and probably Lasiosiphon Hugelii, *DC.*)

This is very common on all the mountainous tracts of the western side of this Presidency and Bombay, generally on the outskirts of woods, up to an elevation of 5000 feet, also in Ceylon and N. Bengal ; it is rather variable in the shape of the leaves and pubescence and shape of the perianth scales, and DeCandolle divides it into 5 or 6 species, but they all merge one into the other. The bark is used for poisoning fish in South Canara and Ceylon, and a very excellent fibre is made out of it ; in Ceylon the plant is called Naha.

Analysis, Pl. XXV, fig. 2.

1. Portion of a branch in flower.
2. A flower bud.
3, 4. Full flowers.
5. Flower opened.
6. Ovary, style, and stigma.
7, 8. Anthers, front and back view.
9. Ovary cut vertically.
10. Ovary cut tranversely. (All drawn from living specimens collected on west slopes of Nilgiris, 4000 feet elevation.)

CANSJERA. Gmel.

Gen. Char. Calyx or perianth short deciduous with 4 small lobes spreading or recurved, without scales in the throat. Stamens 4 with slender filaments inserted at the base of the perianth, hypogynous scales 4 alternating with the stamens, ovary fleshy with a minute cavity, and 1 (or 2 or 3 when very young) pendulous ovule. Fruit a berry with a single erect seed, embryo small towards the summit of a fleshy albumen. Shrubby climbers, leaves alternate, flowers small in axillary spikes.

1. Cansjera Rheedii, *Gmel.*—A climbing shrub, young branches and inflorescence minutely pubescent or glabrous, leaves almost sessile ovate-acuminate or broadly lanceolate, 1½-2 inches long glabrous ever-green and rather thick. Spikes about 1 inch long. Flowers yellow, sessile, rather distant, perianth about 1½ lines long with 2 minute bracteoles at the base. *Gmel. in DC. Prod.* xiv. 519 ; —*Wight Icones tab.* 1861;—*Benth. Fl. Hong Kong* 296. C. lanceolata, *Benth. in London Journ. Bot.* i. 491.

This plant is common in hedges, &c., in the plains throughout the peninsula and Ceylon, also in the Archipelago and Hong-kong.

Analysis, Pl. XXVI, fig. 6.

1. Portion of a branch and spike of flowers.
2. Magnified portion of the spike.
3. A single flower.
4. Flower open.
5. Ovary, stigmas and the hypogynous glands.
6. Anther, front view.
7. Anther, back view.
8. Branch in young fruit, the remains of the hypogynous glands still visible.
9. Young fruit cut vertically, showing the single erect seed.

GYRINOPS. GÆRTN.

For Gen. Char. seeletter-press to Pl. ccciii.

1. GYRINOPS WALLA, *Gærtn.*—For description, &c. see Pl. ccciii.

PHALERIA. JACK.

Gen. Char. Calyx colored, funnel-shaped, limb 4-cleft, lobes subequal, jaws naked, stamens 8 inserted near the summit of the tube, filaments exserted the alternate ones opposite the calyx-lobes longer, ovary sessile surrounded at the base with a cup-shaped disk, style terminal filiform exserted, stigma capitate papillose, drupe ovoid. Trees or shrubs, leaves opposite or alternate coriaceous short petioled, flowers in heads or umbels axillary terminal or cauline furnished with a common involucre. *Jack Malay Misc.* Drymispermum, *Reinw.*

1. PHALERIA CAULIFLORA, *Thw.*—A small elegant glabrous tree, branches elongate subpendulous, leaves shining oblongo-lanceolate with a longish acumination acute at the base, shortly petioled, 6-9 inches long by 1½-3½ inches broad, capitules cauline very shortly pedunculate, bracteoles ovate acute about 3 lines long, flowers white 8 lines long, calyx glabrous, lobes rounded obtuse villous at the margins, stamens in 2 series, filaments alternately slightly longer, fruit ovoid a little acuminate about the size of a nut fleshy red. —Drymispermum cauliflorum, *Thw. En. Pl. Zey. p.* 251.

Ceylon, Hewisi, on the banks of a stream.

Analysis.

1. Portion of a branch in leaf.
2. Flowers.
3. A flower open.
4. Stigma.
5. Bract or involucre-leaf.
6. View of an anther.
7. Ovary.
8. Vertical section of the same.
9. Transverse section of the same.
10—13. Analysis of the fruit. (From a drawing communicated by Dr. Thwaites.)

ORDER LXV—ELÆAGNACEÆ.

Perianth tubular, free but persistent at the base and contracted above the ovary, the upper portion deciduous 2-or 4-lobed Stamens equal to and alternate with the perianth-lobes or twice as many, inserted in the tube or at its base. Anthers 2-celled, opening longitudinally. Ovary 1-celled, with 1 erect ovule. Fruit indehiscent, usually succulent, enclosed in the persistent base of the perianth. Seed with a very thin or without albumen. Embryo straight, the radicle inferior. Trees or shrubs, more or less covered with scurfy stellate scales. Flowers in axillary clusters or cymes.

An order of no importance to the forester; it is only represented by a single species of Elæagnus, a small straggling tree or large shrub. In Northern India the genus Hippophae yields a small tree.

ELÆAGNUS. LINN.

Gen. Char. Flowers hermaphrodite. Perianth 4-lobed valvate in the bud. Stamens 4, inserted in the tube. Style subulate, recurved, and stigmatic along one side at the top.

1. ELÆAGNUS LATIFOLIA, *Linn.*—A straggling shrub or small tree, armed or unarmed, more or less densely rusty-scurfy, leaves elliptic or oblong, glabrous above, covered beneath with silvery or ferruginous scales, flowers axillary pedicelled or subsessile in dense heads or racemose or subsolitary, silvery and more or less scurfy, tube of calyx cylindric, limb 4-angular, fruit oblong succulent edible. *Linn*;—*Wight Icones*, 1856. E. conferta, parvifolia et arborea, *Roxb.* E. ferruginea, *A. Rich.* E. Wallichiana, *Sch.* E. Thwaitesii, *Schl.* E. kologa, *Schl.*

A very variable plant, common almost throughout India and Ceylon up to 8000 feet; its fruit makes good tarts.

Analysis, Pl. XXV., fig. 1.

1. Portion of a branch in flower.
2, 3. Flowers.
4. Flower opened.
5, 6. Anthers, front and back view.
7. Vertical section of ovary.
8. Transverse section of ovary.
9. Fruit.
10. Vertical section of fruit.
11. Transverse section of fruit.
12—15. Seed and embryo.
16. Magnified portion of the under surface of the leaf.
17. Portion of a peduncle.
18. A magnified scale. (Partly from Dr. Wight's drawing, partly from living flowers.)

ORDER LXVI—SANTALACEÆ.

Flowers hermathrodite or diœcious. Perianth-tube wholly or partially aduate, the limb with 3 to 5 lobes or segments, valvate in the bud. Stamens as many as the lobes and opposite to them, inserted at their base or within the free part of the tube. Anthers 2-celled, opening longitudinally. Ovary inferior, 1-celled, with 3 to 5 ovules suspended from a free erect placenta. Fruit an indehiscent nut or berry, with a single seed. Albumen fleshy. Embryo straight with a superior radicle. Herbs or shrubs, rarely trees. Leaves alternate or rarely opposite, entire, without stipules. Flowers usually small and green, in terminal or lateral heads, cymes, or spikes.

This order yields the Sandalwood (Santalum album) so common in the hill tracts of Mysore, Salem and Coimbatore, but otherwise it is of no importance. Pyrularia Wallichiana, a small tree common in Coorg, and Osyris arborea, a shrub, are the only other trees or shrubs. Thesium Wightianum is a small suffruticose plant found on the Nilgiris. Henslowia is a genus found in N. India yielding one shrub.

Thorny—	
Flowers unisexual	PYRULARIA.
Unarmed—	
Flowers hermathrodite, stamens 4-5	SANTALUM.
Flowers unisexual, or female and hermathrodite, stamens 3	OSYRIS.

PYRULARIA. MICH.

For Gen. Char. see letter-press to Pl. cccix.

1. PYRULARIA WALLICHIANA, *A. DC.*—For description, &c. see Pl. cccix.

SANTALUM. LINN.

For Gen. Char. see letter-press to Pl. cclvi.

1. SANTALUM ALBUM, *Linn.*—For description, &c. see Pl. cclvi.

OSYRIS. LINN.

Gen. Char. Flowers unisexual, or male and hermathrodite, perianth-tube slender in the male flowers, obconical in the female, or hermathrodite, deeply 3-(4-) lobed, lobes ovate acute. Stamens 3 (4), filaments short, anthers 2-celled, disk concave, lobes round covering the upper and entire portion of the perianth, ovary fleshy inferior, style short, stigmas 3 (4) alternate with the lobes of the perianth, placenta straight very short bearing generally 3, sometimes 2-4 ovules at it apex, drupe ovoid globose crowned with the remains of the perianth-lobes and disk, seed filling the single cell, embryo oblique in the upper part of the copious albumen, radicle superior, cotyledons lanceolato-terete semi-incurved longer than the radicle. Shrubs or trees, branches angled, leaves alternate or rarely opposite. Male flowers congested at the apex of the peduncle. Female solitary or few.—Casia, *Cam. Lob., &c. Tourn. inst, p.* 664. Colpoon, *Berg. Pl. Cap. p.* 38.

1. OSYRIS ARBOREA, *Wall.*—A shrub, very ramous, everywhere glabrous, young shoots 3-sided with prominent sharp angles, leaves short petioled, from oblong elliptico-lanceolate to elliptic obovate, mucronate, ½ 2 inches long 4-15 lines broad, perianth 3-lobed. *Male* flowers umbellato-capitulate, peduncles axillary and terminal shorter than the leaves, 6-8 flowered; *female*, peduncles axillary and terminal 1-3 flowered elongating in fruit, the anthers often polleniferous, ovary conical, style short, stigma 3-lobed, fruit ½ inch long small red. *Wall. in DC. Prod.* xiv. *p.* 633. Osyris Wightiana, *Wall. in DC. Prod. l. c.*

This shrub is common on all the mountains on the west side of the Presidency and in Ceylon 5000-8000 feet, it is also found in North Bengal.

Analysis, Pl. XXVI, fig. 6-*A.*

Dissections of flowers and fruit. (Copied from Dr. Wight's *Icones.*)

ORDER LXVII—SALICACEÆ.

Flowers diœcious naked or with a cup-like bract sessile or shortly pedicelled arranged in sessile lateral subterminal aments, perianth none, torus swelling into a simple or double gland or an obliquely truncated ring or cup. *Male* : stamens 2-many distinct or monodelphous exserted from the centre of the torus, filaments filiform, anthers 2-celled fixed at the base, cells parallel dehiscing longitudinally, rudiment of ovary none. *Female* : ovary free sessile or pedicelled 1-celled formed of 2 carpels with the margins valvately connate or more or less inflexed, ovules numerous erect anatropal at the base of the cell or adhering to the lower part of the sides, styles 2 generally connate or wanting. Stigmas 2-entire or 2-parted the divisions more or less filiform, or fleshy. Capsule leathery 1-celled 2-valved many-seeded, valves separating at the apex, at length more or less revolute, seeds small erect from the lower part of the axis of each valve or from the base of the cells completely covered with long silky hairs which arise from the short funicle, testa membranaceous, albumen none. Embryo erect, cotyledons plane convex elliptic, radicle small inferior. Trees or shrubs, leaves alternate simple entire or more or less serrulate often bearing glands at the serratures, penniveined or obsoletely palminerved, deciduous, stipules scaly deciduous or foliaceous and often persistent oblique subserrate.

This order is only represented in Southern India by one species of Willow (Salix tetrasperma), which is found from the sea level up to the top of our highest mountains. The same species of Salix and several others are found in N. India, and 2 species of Populus (Poplar.)

The Salix Babylonica (or Weeping Willow) is an introduced tree in Southern India.

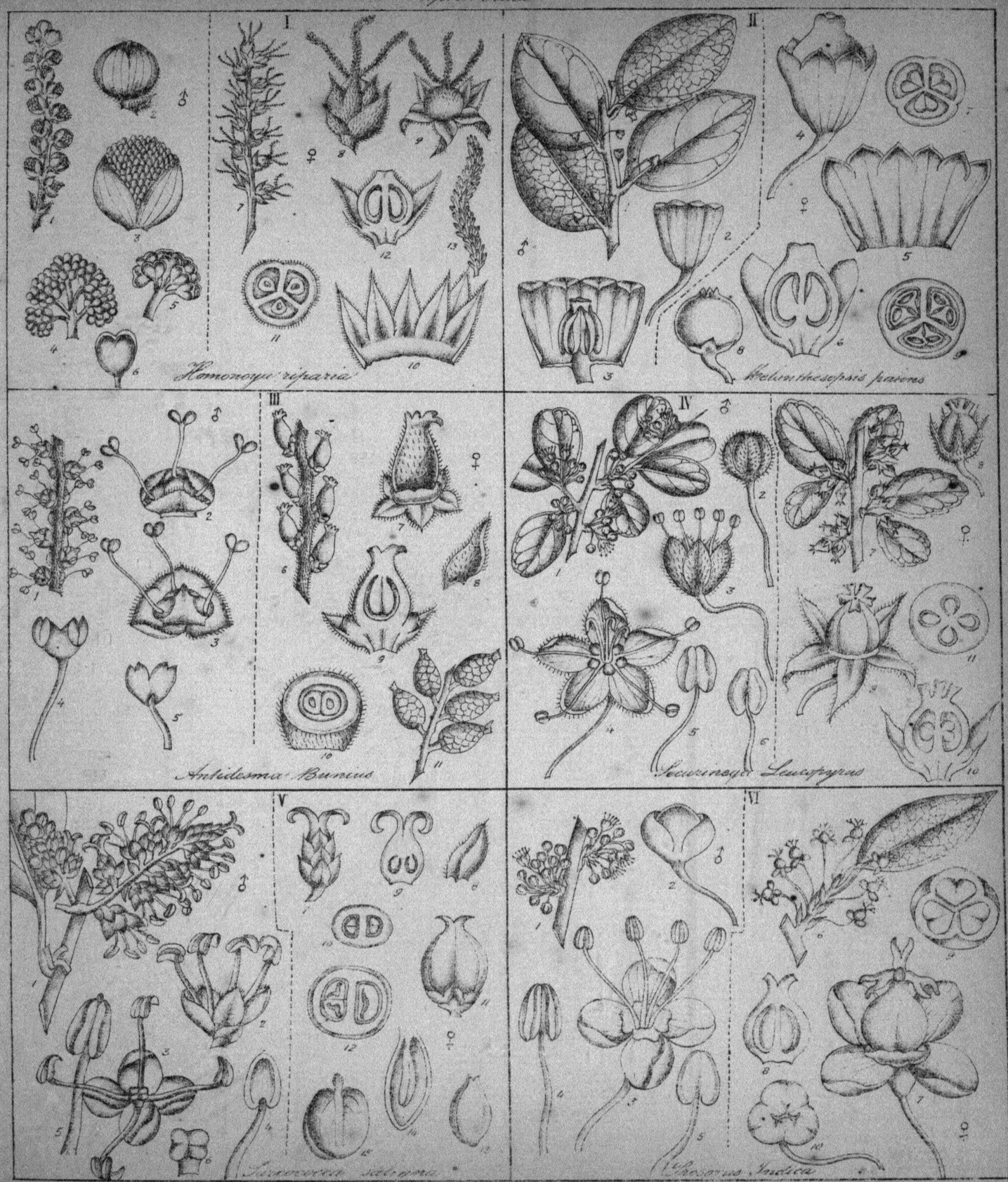
SALIX. LINN.

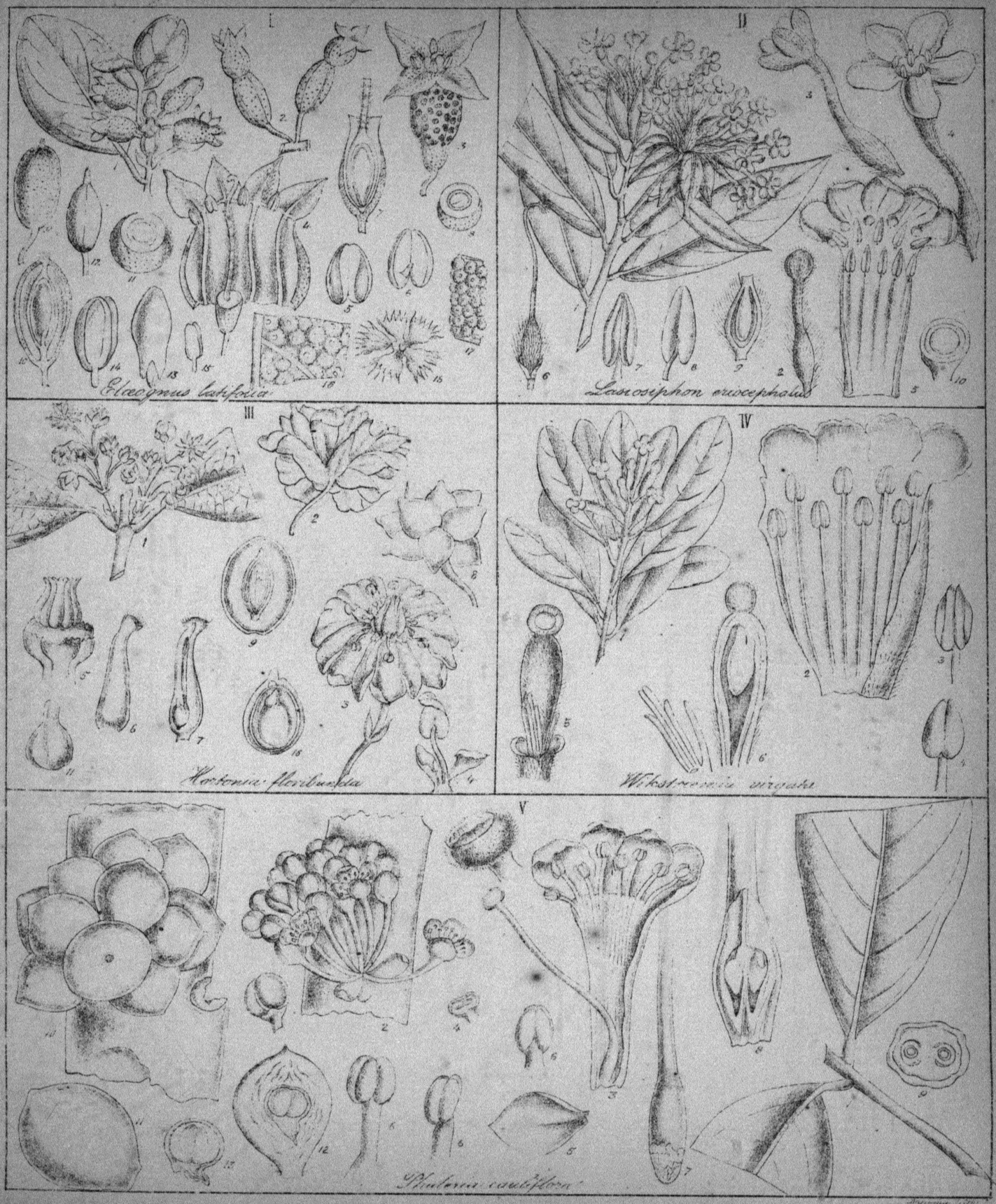
For Gen. Char. see letter-press to Pl. cccii.

1. SALIX TETRASPERMA, *Roxb.*—For description, &c. see Pl. cccii.

I
Sarcoclinium longifolium
II
Agrostistachys Indica.
III
Actephila excelsa.
IV
Cleistanthus patulus
C. Pallidus.
V
Lebidieropsis orbicularis
VI
Codiæum umbellatum.

Euphorbiaceæ




I
Elaeagnus latifolia
II
Lasiosiphon eriocephalus
III
Hottonia floribunda
IV
Wikstroemia virgata
V
Phitonia cauliflora

NOTICE.

All the Plates of the work are completed with this Part; a supplemental part will shortly be issued completing the Manual, and giving Title-pages, Index, &c. &c. The work will then be ready for binding up in 2 volumes.

HELICIA ROBUSTA. (Nat. order Proteaceæ.)

HELICIA, *Lour.*—GEN. CHAR. Flowers hermaphrodite. Perianth regular, the tube slender, the laminæ small, the segments all much revolute when separating. Anthers on short filaments inserted a little below the laminæ, the connective produced into a short appendage. Hypogynous glands equal, distinct or united in a ring or cup round the ovary. Ovary sessile, with a long straight style, slightly thickened at the end with a terminal stigma; ovules 2, ascending laterally attached near the base. Fruit hard, nearly globular, indehiscent. Seeds either solitary and globular or two together and hemispherical; testa veined or rugose, cotyledons thick and fleshy. Trees or tall shrubs, leaves alternate, entire or toothed. Flowers pedicellate in pairs, in terminal or axillary simple racemes, the pedicels of each pair often more or less connate. Bracts very deciduous (or sometimes none ?)

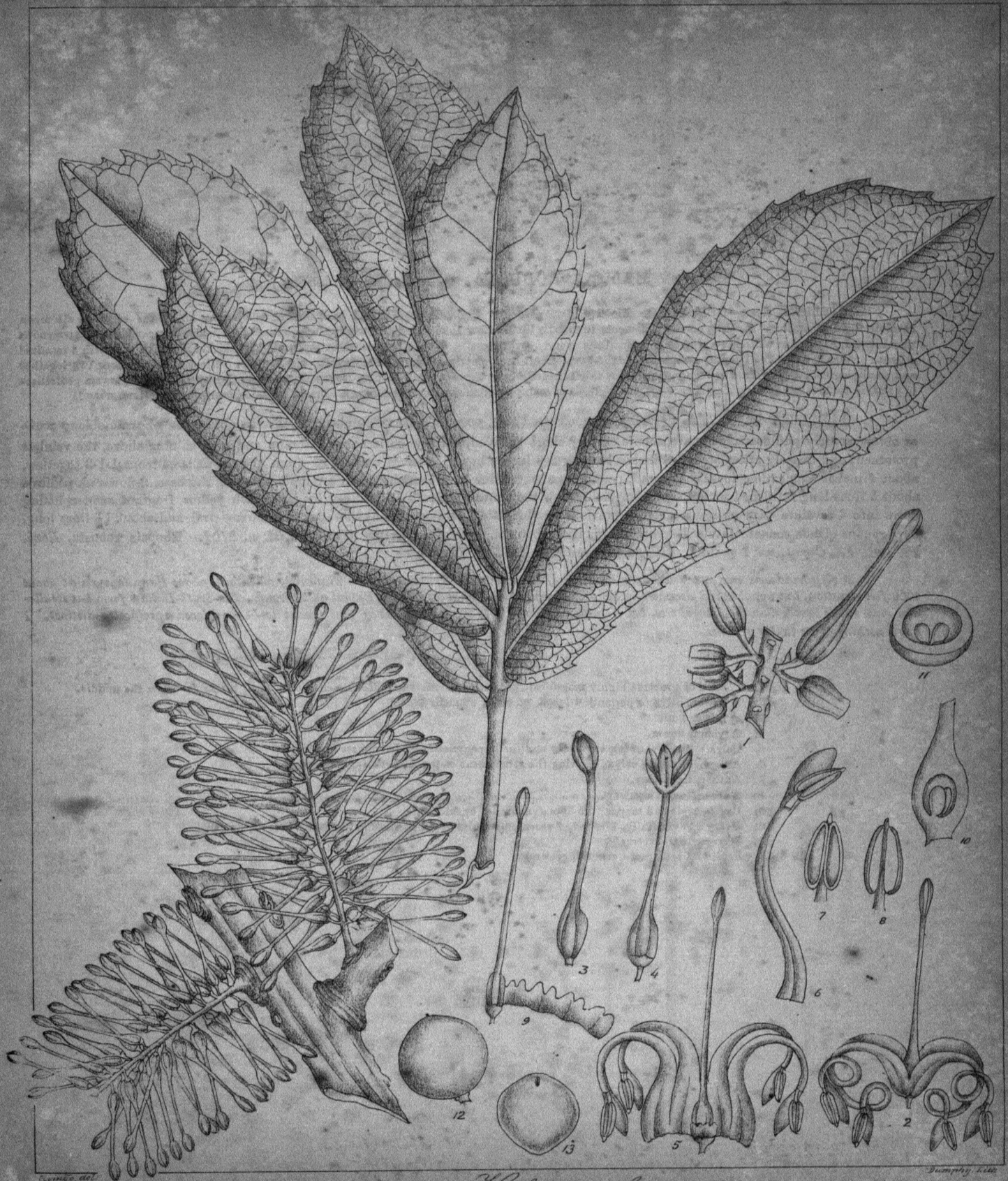
HELICIA ROBUSTA. (Wall.) A good sized tree, young shoots rufo-pubescent, leaves oblong or obovato-oblong acute or obtuse acutely and coarsely serrate, sessile or very short petioled, thickly coriaceous, glabrous and very shining above, the veinlets prominent and densely reticulated, 5-8 inches long by 2-3 inches broad, racemes axillary or from the old axils or truncal 1-3 together, about 4 inches long rather densely flowered, peduncles about 1 line long furnished with a minute bract at the base, 2-flowered, pedicels about 3 lines long furnished with a small bracteole below the centre, perianth 10-12 lines long greenish yellow fragrant soon splitting down into 4 revolute very narrow segments, previous to which the free segments at the apex are narrow-oval and about 1½ lines long, hypogynous glands connate into a 4-crenated cup, fruit about the size of a cherry. *Wallich List. n.* 2702. Rhopala robusta, *Roxb. Fl. Ind., Ed. Carey., vol.* i. *p.* 366. Helicia Travancorica, *Bedd. in Distrib.*

A very handsome tree, not uncommon on banks of streams on the Travancore and Tinnevelly mountains above Paupanassam at about 4000 feet elevation, but not observed elsewhere in the presidency; it also inhabits Eastern Bengal and Birmah. The South-Indian form has smaller and more sessile leaves than the Bengal tree, but it answers too closely to the descriptions of that species to be considered specifically distinct. I know nothing of its timber or uses.

Analysis.

1. Portion of a raceme highly magnified, peduncles 2-flowered, pedicels each with a small bracteole below the middle.
2. A flower, calyx or perianth 4-lobed, no corol, stamens 4
3. A flower bud.
4. A young flower.
5. Calyx opened, shewing the ovary and the hypogynous glands connate in a cup.
6. A segment of the calyx, shewing the attachment of the anther near its apex.
7. Anther, front view.
8. Anther, back view.
9. Ovary, style and stigma, the hypogynous cup opened out.
10. Ovary cut vertically, 1-celled, 2 ascending ovules attached slightly above the base of the cell.
11. Ovary cut transversely.

12 & 13. Fruit and seed (not quite full grown.)



Helicia robusta (Wall.)

SALIX TETRASPERMA. (Nat. order Salicaceæ.)

SALIX, *Tourn.*—GEN. CHAR. Flowers diœcious, arranged in more or less lax aments. Scales lanceolate or concavo-rotundate or obovate, entire and glanduloso-crenulate towards the apex, torus glanduliform entire or ring-like or sub-cyathiform or in 2 gland-like bodies. Stamens 2-12, filaments filiform free or connate at the base, ovary glabrous or hairy often pedicellate, style elongate or obsolete entire or cleft, stigmas 2 thick short and entire or 2-lobed. Capsule 1-celled 2-valved, valves bearing the seeds near the base. Seeds 4-many erect comose, embryo exalbuminous orthotropal, radicle inferior. Large trees or shrubs, leaves alternate lanceolate to obovate, penniveined.

SALIX TETRASPERMA. (Roxb.) A large tree, leaves linear to ovato-lanceolate apiculate serrulate, shining above whitish below, membranaceous to coriaceous, 2-4 inches long by 1-1½ broad, aments peduncled or subsessile, the peduncles with or without leaves. *Male* aments yellowish, 2-5 inches long, sweet scented. Scales woolly, entire subrotund or oblongo-spathulate. Stamens 5-12, filaments free villous at the base, torus of 2 gland-like bodies. *Female* aments shorter than the male greenish, scales woolly spathulate glanduloso-crenulate, torus annular or suburceolate, ovary on a long stipe, style obsolete, stigmas 2, each 2-lobed. Capsule ovate, seeds 4. *Roxb. Fl. Ind.* iii. *p.* 753 ;—*Wight Icones tab.* 1954. S. ichnostachya, *Wight Icones tab.* 1953.

This tree is very common throughout this Presidency from sea level up to 7000 feet, and in Bengal, and it also extends to Java, but is absent from Ceylon; it is almost always found in the vicinity of water. I have never known the timber used for any purpose except firewood; it is said to be tough and elastic, and it weighs 37 lbs. the cubic foot. The tree flowers in January and February, and it is readily propagated from cuttings; it is called Walloonj or Bucha on the Bombay ghats, and Baishi in Hindostanee.

Analysis.

1. A branch of the male tree in flower (collected on the Anamallays, 4000 feet elevation.)
2. Branch of the female tree in young fruit (S. Canara plains, sea level.)
3. Magnified portion of the male inflorescence.
4. A male flower, shewing 10 stamens—they vary from 5 to 12.
5. An anther, front view.
6. A portion of an ament of young fruit.
7. A young fruit or capsule.
8. The same burst into 2 valves, shewing the cottony mass which envelopes the seed.
9. Transverse section of the same, the 4 seeds immersed in wool.
10. Vertical section of the same.

11 & 12. Male flowers, shewing 6 and 7 stamens.

13. Magnified portion of a female ament.

14 & 15. Female flowers.

16. Vertical section of the ovary.
17. Transverse section of the ovary.

(Nos. 1 to 10 drawn from dried specimens, the male from 4000 feet elevation, the female from sea level; Nos. 11 to 17 drawn from living specimens collected at 7000 feet on the Nilgiris.)

Salix tetrasperma (Roxb.)

GYRINOPS WALLA. (Nat. order Thymelaceæ.)

GYRINOPS, *Gærtn.*—GEN. CHAR. Perianth colored tubular slender, the limb 5-parted, scales 5, gland-like hid in a dense ring of hairs in the jaws of the tube, anthers 5 sessile in the jaws of the tube, included, opposite the segments of the perianth affixed by their back, hypogynous scales none. Ovary on a long stipe attenuated at both ends pubescent 2-celled, cells 1-ovuled, style terminal cylindric deciduous, stigma flattened globose undivided. Capsule stipitate coriaceous loculicidally 2-valved, seed solitary. *Gærtn. Fr.* 2.

GYRINOPS WALLA. (Gærtn.) A small tree or large shrub, young parts sericeous, branches slender of an orange yellow color, as is the whole plant; leaves oblongo-elliptic more or less acuminate subcoriaceous very glabrous in age, densely transverse-venose, (as in Calophyllum) 2-4 inches long by $\frac{3}{4}$-$1\frac{3}{4}$ inches broad, petioles channelled about 3 lines long, inflorescence sericeous, peduncles axillary or from the old axils or from the stem between the leaves, 2 lines long 3-8 flowered, pedicels 2-3 lines long, bracteoles linear lanceolate chaffy about 3 lines long, sericeous on the outside glabrous within very early caducous, perianth orange colored 4-6 lines long attenuated at the base, lobes about 1 line long ovate patent. Capsule spathulato-obovate compressed shortly apiculate 6-8 lines long. *DC. Prod.* xiv. 602;—*Wight Icones tab.* 1850.

A very elegant little tree common about Badagam near Galle, and the warmer parts of the south of Ceylon, called Walla by the Singalese; the bark yields a very strong fibre.

Analysis.

1. A flower bud.
2. A flower.
3. A flower cut open, shewing the insertion of the sessile stamens and the dense ring of hairs just within the apex of the tube; 5 yellow glands are hid within this hair.

3*a*. One of the glands removed from the ring of hairs.

4. An anther.
5. Stipitate ovary, style and stigma.
6. Ovary cut vertically.
7. Ovary cut transversely.
8. Fruit. (Drawn from flowers in spirits.)

Gynopogon Wallichianus (Gaertn.)

PYRULARIA WALLICHIANA. (Nat. order Santalaceæ.)

PYRULARIA, *Mich.*—GEN. CHAR. Flowers hermathrodite and male, the male subglobose, the hermathrodite turbinate, perianth 5-4-fid, lobes imbricate (or valvate ?) each furnished on the inside near the base with a hairy scale, stamens in both hermathrodite and male as many as the perianth lobes opposite to them and inserted at their base just under the margin of the disk, filaments short entire or bifid at the apex, anthers ellipsoid 2-celled, cells distinct dehiscing longitudinally, disk cupuliform the margin 5-lobed, the lobes thick entire or emarginate alternate with the segments of the perianth, ovary in the male flowers obsolete, style thick 4-grooved, stigma 4-(3-) lobed, ovary in the hermathrodite flowers inferior, placenta erect tapering at length twisted, ovules 2-4 diverging and pendant from the apex of the placenta, drupe inferior pyriform crowned at the depressed umbilicate apex with the lobes of the perianth, putamen 1-seeded. Trees or shrubs, often armed, leaves alternate entire, flowers in axillary spikes. *Mich. Fl. Bor. Arn.* 2 *p.* 234. Hamiltonia, *Muhlenb.* not *Roxb.* Sphærocarya, *Wall. in Roxb. Fl. Ind.* ii. 371. Scleropyrum, *Arn. in Mag. of Zool. and Bot.* ii. 550.

PYRULARIA WALLICHIANA. (Wight.) A middling sized or small tree, trunk very thorny, young parts reddish, branchlets terete armed glabrous, leaves coriaceous glabrous ovate or ovato-lanceolate acute or obtuse shining above paler beneath, 3-6 inches long by 1½-3 inches broad, penniveined, the veins distant 3-4 on each side, petioles 2-4 lines long, spikes axillary or from the old axils solitary or several together, the male very densely flowered 1-1½ inches long, the flowers reddish globose, each with a minute hairy bract, perianth hairy on the outside 5-(4-) lobed (5 in all the flowers I have examined), lobes distinctly imbricate, filaments flat bifid at the apex, ovary obsolete, style thick angular, stigma 4-lobed, lobes erect acute 2 larger than the others, *the hermathrodite* laxly flowered 2-4 inches long, the flowers turbinate 4-5 lines long, hairy on the outside, each with a small bract at the base, stamens smaller than in the male but bearing pollen, stigma 4-lobed larger than in the male flower, lobes spreading, fruit about 1¼ inches long.—Sphærocarya Wallichiana, *Wight* ;—*WA. in Edin. Journ.* 15. *p.* 180. Scleropyrum Wallichiana, *Arnt.* ;—*Wight Icones tab.* 241. Idu-mulli, *Rheed. Mal.* 4 *t.* 18. Pyrularia Wallichiana et Ceylanica, *DC. Prod.* xiv. 629.

This tree is most abundant in Coorg and in parts of Wynaad, 3-5000 feet elevation, but I have not observed it elsewhere in this presidency; it is also found in Ceylon (4-6000 feet). The wood is light colored and curiously grained, and is in use in Ceylon for ordinary purposes.

Analysis.

The figure represents a branch with male inflorescence only.

1. Male spike.
2 & 3. Male flowers, shewing the imbricate lobes of the perianth.
3*a*. The 4-lobed style of the male flower.
4. Anthers, front view.
5. Anthers, back view.
6. Portion of the perianth and disk, shewing the hairy scales on the inside of the segments of the former and the insertion of the stamens.
7. Hermathrodite inflorescence.
8. Hermathrodite flower (lobes imbricate) and bract.
9. Hermathrodite flower and ovary cut vertically.
10. Fruit.

(The male drawn from living specimens, the hermathrodite from flowers in spirits.)

Pyrularia Wallichiana Wight

ALLÆANTHUS ZEYLANICUS. (Nat. order Urticeæ.)

ALLÆANTHUS, *Thw.*—GEN. CHAR. Flowers diœcious. *Male*, in axillary unilateral dense aggregated peduncled spikes, perianth 4-parted, segments imbricate in the bud, stamens as many as the segments and opposite to them inflexed in bud, rudiment of ovary small conical subulate. *Female*, few in globose axillary congested heads mixed with many abortive squamæform ones, perianth tubular irregularly 4-cleft, segments imbricate, ovary free sessile 1-celled, ovule solitary pendulous campylotropal, style subterminal short, stigma elongate simple or rarely with a shorter 2nd branch. *Thw. En. Pl. Zey. p.* 263, *and Hook. Journ. of Bot.* vi. 302.

ALLÆANTHUS ZEYLANICUS. (Thw.) A large tree 30-40 feet high, branches terete pilose milky, leaves alternate distichous cordato-lanceolate acuminate serrate pennivelned pilose, paler beneath venose, 3-4 inches long by 1¼-1¾ inches broad, petioles pilose 3 lines long, stipules oblong acuminate membranaceous nearly smooth striated oblique deciduous 2 lines long 1½ lines broad. *Male*, spikes 1-2¼ inches long 2 lines broad, pilose, peduncle 2-3 lines long. *Female*, heads 4 lines in diameter shortly peduncled pilose. *Thw. l. c.*

This tree has only been detected in Ceylon (central provinces, up to 2000 *feet elevation) where it is called Allandoo; the timber is in use for ordinary purposes; a very tough fibre is obtained from the inner bark, which is used for a variety of purposes.*

Analysis.

1. A branch of the male in flower.
2. A male flower.
3. Anther, front view.
4. Anther, back view.
5. A branch of the female in flower.
6. A head of female flowers cut through vertically.
7. A female flower with the short style and long simple stigma. One of the branches of the latter short.
9. The tubular 4-cleft perianth.
10. Ovary cut vertically, shewing the solitary pendulous ovule.
11. The abortive scale-like ovaries from the female capitula. (From a drawing communicated by Dr. Thwaites.)

Govindo del. Dempsey Delt.

Alternanthus Zeylanicus (Thw.)

LAPORTEA CRENULATA. (Nat. order Urticeæ.)

LAPORTEA, *Gaudich*.—GEN. CHAR. Flowers monœcious or diœcious. *Male*, perianth 4 5 parted, stamens as many opposite the perianth segments, filaments incurved in the bud, rudiments of ovary subglobose. *Female*, perianth 4 parted, segments equal or unequal, stigma long subulate tapering villous, ovary free 1-celled, ovule solitary erect, achenium obliquely ovate or subglobose, seed erect, albumen fleshy, cotyledons ovate, radicle cylindric superior. Trees, shrubs or herbs, leaves alternate, flowers in axillary panicles.

LAPORTEA CRENULATA. (Roxb.) A small tree or large shrub, diœcious unarmed, leaves ovate-elliptic to oblongo-elliptic with a longish acumination, crenulate or serrate towards the apex or quite entire, 5-12 inches long by 2-4 broad, penniveined, perfectly glabrous on both sides or with a very few long white stinging hairs on the costa beneath and sometimes above, petioles 2-4 inches long more or less furnished with long stinging white hairs, panicles cymose lax shorter than the leaves copiously furnished with the same hairs, flowers small greenish, perianth lobes equal or subequal.—Urtica crenulata, *Roxb. Fl. Ind.* iii. 591. Laportea crenulata et gigantea, *Gaudich.* Urera Javanensis, *Gaudich. Voy. Freyc. p.* 496. Dendrocnide crenulata, *Miq. Pl. Jungh.* 1 *p.* 31.

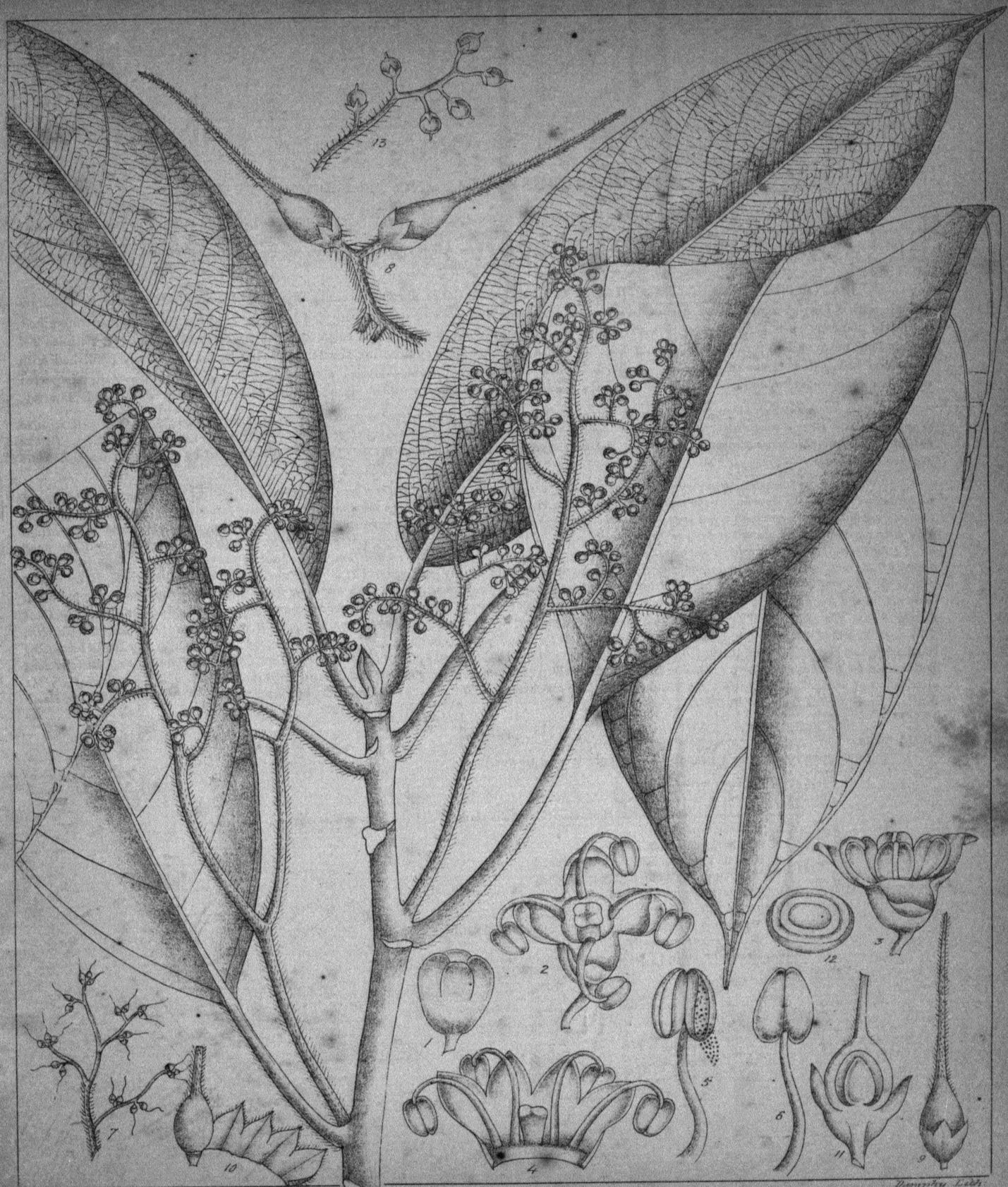
This dreadfully stinging tree or large shrub is only too common in most of our western coast moist forests up to 5000 feet, and it also inhabits Ceylon, Bengal and Java; it is introduced here chiefly to caution Forest Officers against it with reference to its stinging properties. I quote the following from Lindley's Vegetable Kingdom. "Leschenault de la Tour thus describes the effect of gathering Urtica crenulata in the Botanic Garden at Calcutta:"—

"One of the leaves slightly touched the first three fingers of my left hand; at the time I only perceived a slight pricking, to which I paid no attention. This was at seven in the morning. The pain continued to increase; in an hour it had become intolerable; it seemed as if some one was rubbing my fingers with a hot iron. Nevertheless, there was no remarkable appearance; neither swelling, nor pustule, nor inflammation. The pain rapidly spread along the arm, as far as the armpit. I was then seized with frequent sneezing, and with a copious running at the nose, as if I had caught a violent cold in the head. About noon I experienced a painful contraction of the back of the jaws, which made me fear an attack of tetanus. I then went to bed, hoping that repose would alleviate my suffering, but it did not abate; on the contrary, it continued nearly the whole of the following night, but I lost the contraction of the jaws about seven in the evening. The next morning the pain began to leave me, and I fell asleep. I continued to suffer for two days; and the pain returned in full force when I put my hand into water. I did not finally lose it for nine days." "A similar circumstance occurred, with precisely the same symptoms, to a workman in the Calcutta Garden. This man described the sensation, when water was applied to the stung part, to be as if boiling oil was poured over him." In cutting boundary lines, exploring forests, botanizing, &c., I have been very often stung by this plant both on the hands and face, but never found the effects so violent as described by Leschenault; they are however bad enough, the pain being felt more or less for several days and always being intensified by the application of water. With natives the sting often brings on fever, and the plant is known to Coffee planters as the Fever Nettle and the Devil Nettle. In Ceylon it is called Maoosa.

Analysis.

The figure represents a branch of the male tree in flower.

1. A male flower bud.
2 & 3. Views of the male flower.
4. A male flower opened to shew insertion of the stamens and the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Female inflorescence.
8. Portion of the same highly magnified.
9. A female flower.
10. Calyx and ovary.
11. Ovary cut vertically, showing the solitary erect ovule.
12. Ovary cut transversely.
13. Branch in fruit. (All drawn from living specimens).



Saporka crenulata (Roxb.)

ANTIARIS INNOXIA. (Nat. order Urticeæ.)

ANTIARIS, *Leschen.*—GEN. CHAR. Flowers monœcious. *Male* involucre many-flowered many-leaved, leaflets imbricate connate at the base surrounding an orbicular flat or convex receptacle, florets sessile dense-packed, perianth of 3-4 spathulate leaflets connivent towards the apex, stamens 3-8 on a flat receptacle, filaments obsolete or very short, anthers extrorse 2-celled. *Female* involucre 1-flowered, urceolate many cleft at the apex, perianth none, ovary connate with the involucre 1-celled, ovule 1 pendulous from the apex of the cell anatropal. Style terminal bifid the divisions filiform stigmatose, drupe formed of the baccate involucre, seed pendulous. Embryo exalbuminous orthotropal, cotyledons large fleshy ovate plano convex smooth, radicle very short superior. Trees, leaves simple alternate stipulate, peduncles axillary.

ANTIARIS INNOXIA. (Blume.) A gigantic tree up to 250 feet in height and of enormous girth, leaves oblong-elliptic dentate serrulate or entire, scabrous, about 6 inches long by 2-2¼ inch broad, petioles 3 lines long. Male flowers with 3-8 stamens, the perianth leaves generally 4 obovate spathulate cucullate hairy on the outside, fruit size of a nut, purple. *Bl. Rump.* 1. 172 *t.* 54. A. saccidora, *Dalz. in Hook. Journ. Bot.* iii. 231 ;—*Wight Icones tab.* 1958. A. toxicaria, *Hook. Comp. to Bot. Mag.* i. 311 *t.* 17. Lepurandra saccidora, *Nimmo Pl. of Bombay* 193.

This is the largest tree in our forests; it is common along all the Western Ghats from Bombay down to Cape Comorin, and is also found in Ceylon; in the Anamallays it is called Alli, in Bombay Juzoogri, and in Ceylon Ritti. It flowers in the rains and ripens its fruit in January. The wood is soft and of no value, the nuts are intensely bitter and contain an azotized principle, which may prove an active medical agent. On wounding the fruit a milky viscid fluid exudes which hardens into a wax-like substance and becomes black and shining; the inner bark of the tree is composed of very strong tenacious fibres and is adapted for cordage or matting. In Coorg and Wynaad the hill men manufacture sacks from this tree: a branch or trunk is cut corresponding to the length and breadth of the sack required, it is soaked a little, and then beaten with clubs until the fibre separates from the wood; this done the sack formed of the bark is turned inside out and the wood sawn off, leaving a small piece at the bottom of the sack; these sacks are in general use for carrying rice, &c. The male flowers have been described as having 4 stamens each opposite a leaflet of the perianth; my analysis differs considerably, the stamens being always 5-8. The drawings were, however, made from living flowers collected on the Nilgiris.

Analysis.

The figure represents a branch of the tree, shewing the solitary female flowers and the male flowers collected in dense heads.

1. Female flower.
2. Female flower cut vertically, shewing the solitary pendulous ovule.
3. Young fruit.
4. The same cut transversely.

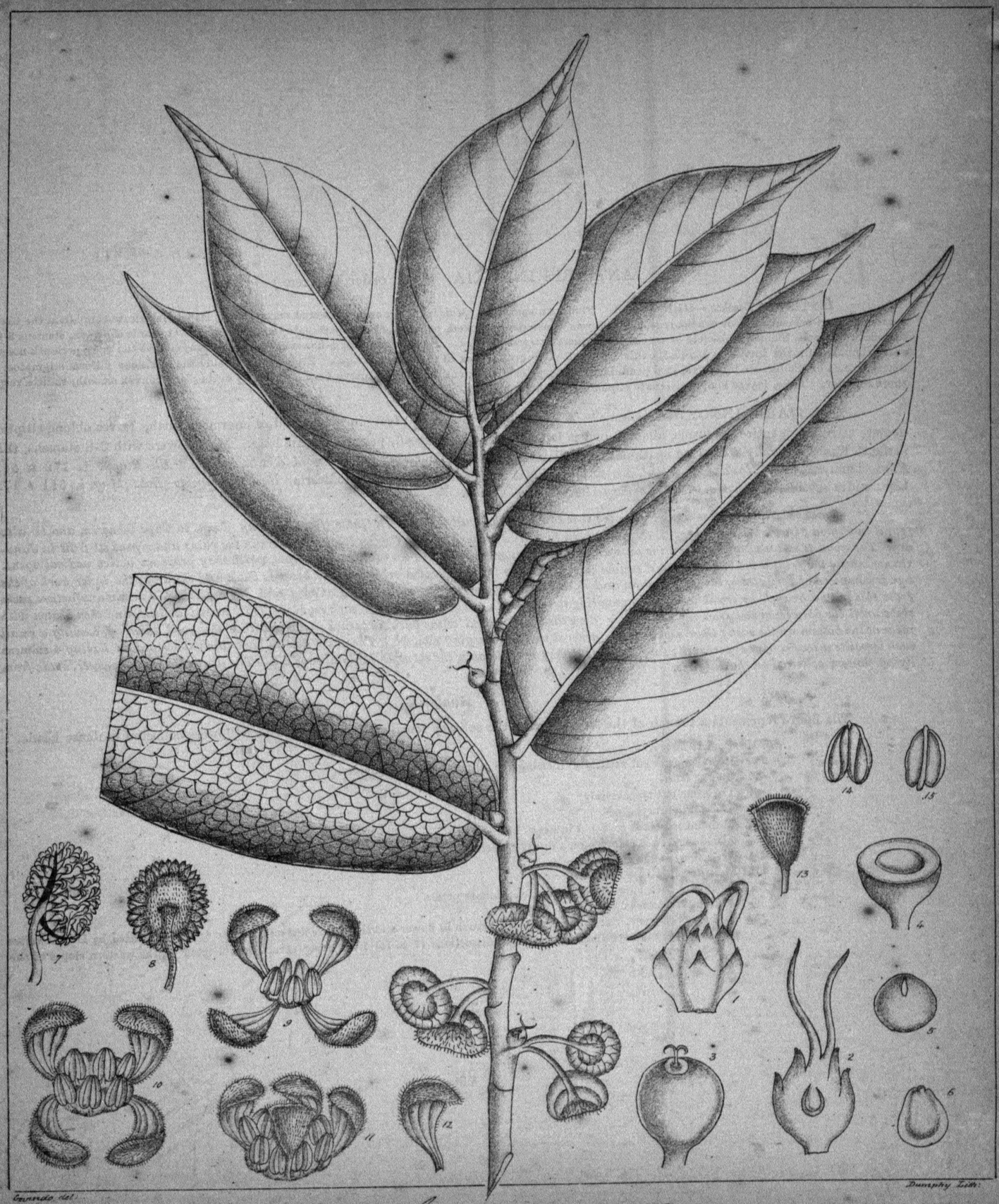
5 & 6. Seed and embryo.

7 & 8. Male inflorescence collected in dense heads.

9. A male flower, 5 stamens on a flat receptacle.
10. Male flower shewing 6 stamens.
11. Male flower with 8 stamens.

12 & 13. Front and back view of the obovate spathulate petals.

14. Anther, front view.
15. Anther, back view. The drawings of the branch in flower and the female dissections (1 to 6) communicated by Dr. Thwaites (from Ceylon specimens); the male dissections (7 to 15) from living specimens collected on the western slopes of the Nilgiris.



Antiaris innoxia (Bl.)

ARTOCARPUS HIRSUTA. (Nat. order Urticeæ.)

ARTOCARPUS, *Linn.*—GEN. CHAR. Flowers monœcious, minute, densely packed on the outside of a globose or oblong succulent receptacle, the males and females in separate heads. Male flowers: Perianth of 2 to 4 segments, imbricate in the bud. Stamen 1. Female flowers: Perianth tubular entire. Style usually simple and linear, protruding from the perianth. Ovary usually 1-celled, with 1 pendulous ovule. Fruit compound, consisting of the somewhat enlarged persistent and consolidated perianths, each enclosing a minute nut. Seeds without albumen. Trees or shrubs, with milky juice. Leaves alternate, entire or divided. Flower-heads axillary or terminal solitary or 2 together.

ARTOCARPUS HIRSUTA. (Lam.) A very lofty tree attaining upwards of 200 feet in height and of great girth, young parts hirsute, leaves ovate to oval (those of saplings or occasionally a few on older trees deeply pinnatifid and serrate) entire acute or obtuse, glabrous above in age, hairy underneath particularly on the prominent parallel veins, 6-12 inches long by 4-6 inches broad, (those of saplings often much larger), petioles 6-12 lines long hirsute, stipules lanceolate hirsute; male aments slender 3-4 inches long and 3 lines in diameter axillary solitary or in pairs, at first erect at length pendulous on peduncles ½-1 inch long, the florets mixed with numerous linear chaffy bracts; female aments solitary oval or roundish about 1 inch long by 6-8 lines broad on peduncles about 3 inches long, the upper part of the florets nearly solid tapering, armed with stiff bristles and almost consolidated with the style which is much exserted, fruit oval about the size of a lemon armed with numerous hispid spines, seeds numerous oval or ovate the size of a bean. *Roxb. Fl. Ind.* iii. 521.

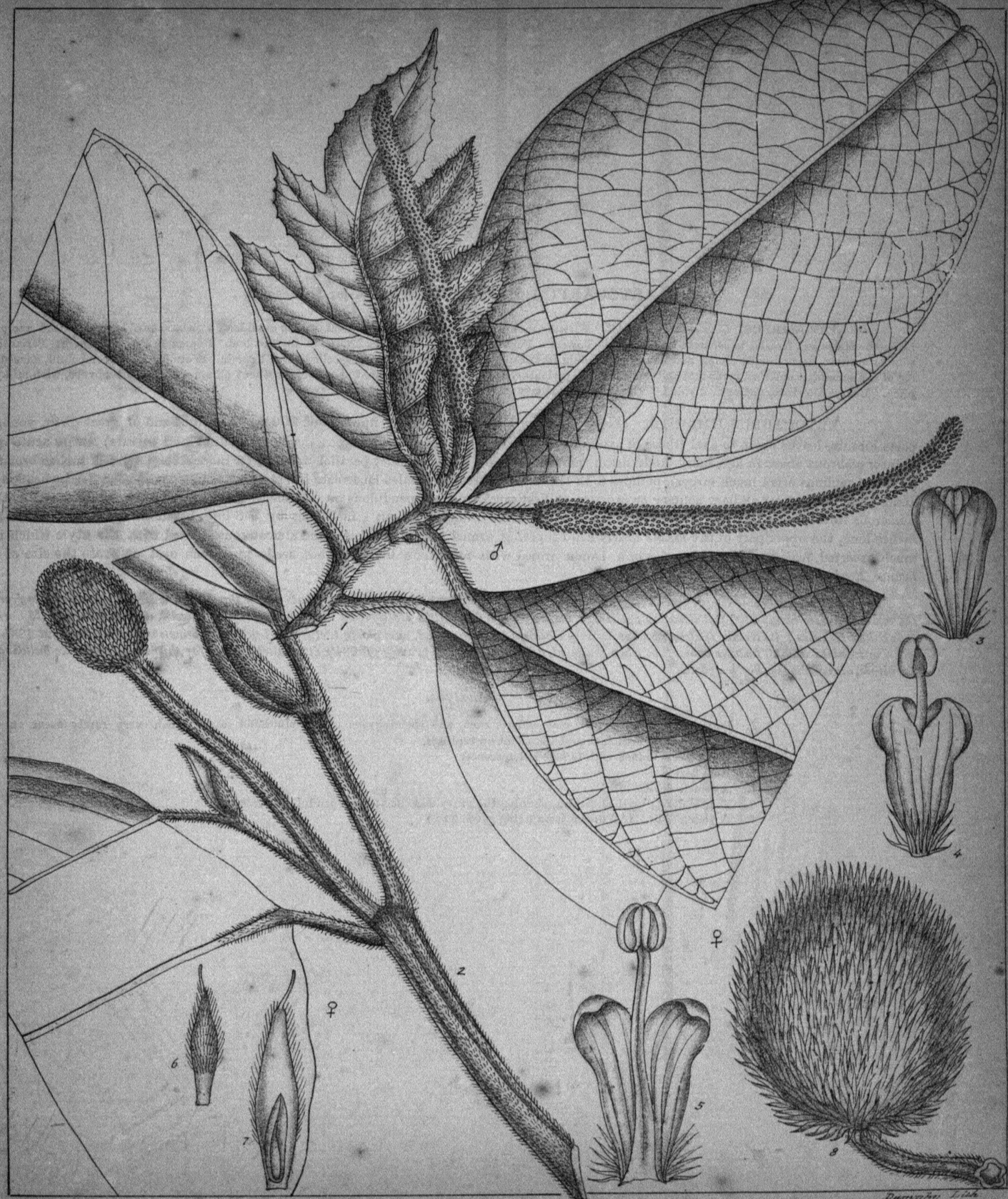
This very valuable timber tree is most abundant in the moist forests of the Western Ghats of the Bombay and Madras presidencies from the sea level up to about 4000 *feet elevation; it is well known by the Tamil and Malayalum names of Ayni and Angelli, and in Canarese (Mysore) it is called Hebulsu; its timber is strong and tolerably close and even grained, of a glossy texture and yellowish brown color, weighs about* 48 *lbs. when unseasoned and* 40 *lbs. per cubic foot when seasoned, and has a specific gravity of* ·604*; it is much in use for ship building, house building, furniture, and various other purposes.*

Analysis.

1. Portion of a branch with male inflorescence, and shewing one of the pinnatifid leaves which very rarely occur on a flowering branch though abundant on saplings.
2. Portion of a branch with female inflorescence.

3, 4, 5. Male florets.

6. A female floret.
7. Female floret, vertical section, shewing the ovary and the solitary pendulous ovule.
8. A young fruit. (All drawn from living specimens.)



Corrado, del.

Dunsiphey, lith.

Artocarpus hirsuta. Lam.

ARTOCARPUS NOBILIS. (Nat. order Urticeæ.)

For Gen. Char. see letter-press to Pl. cccviii.

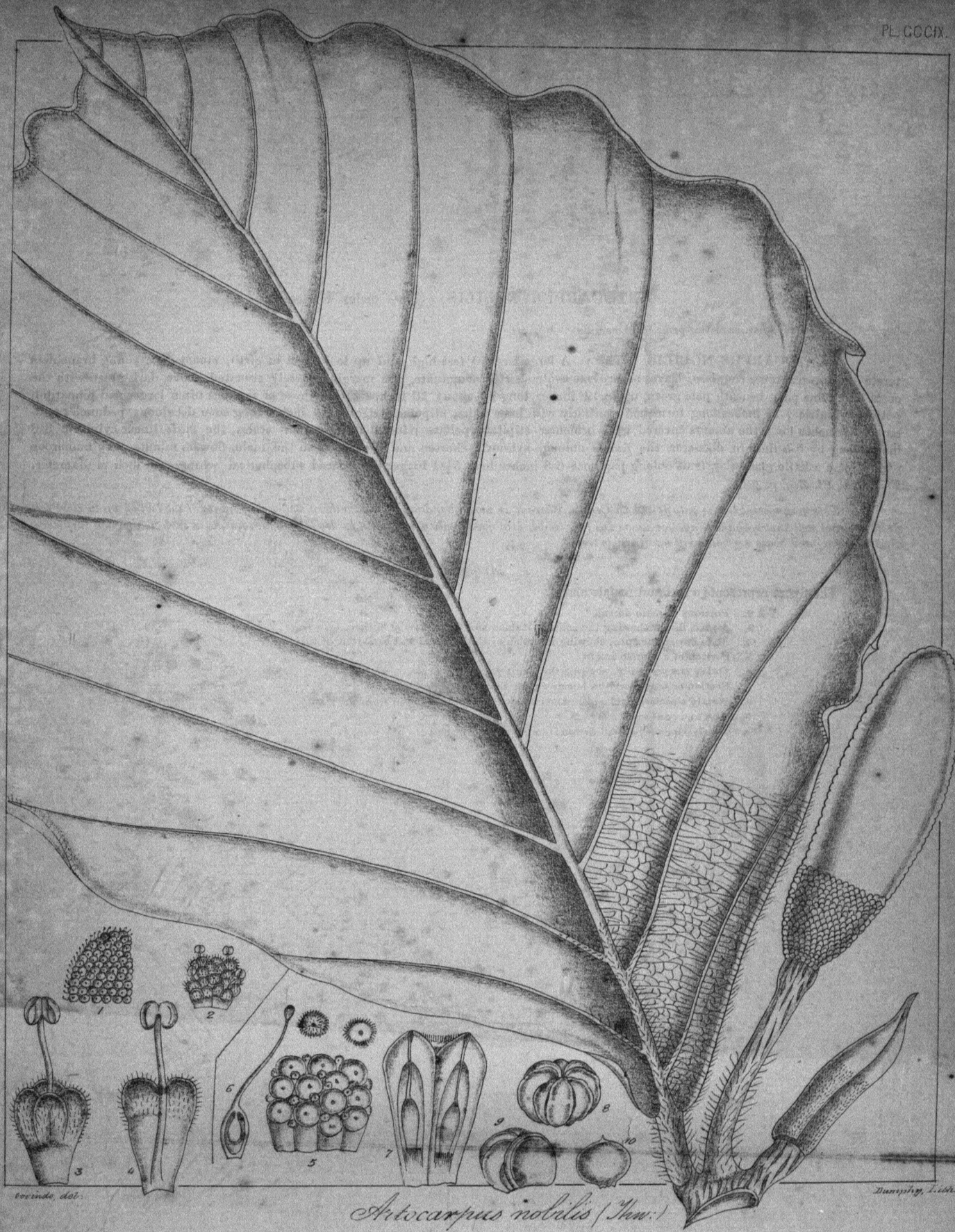
ARTOCARPUS NOBILIS. (Thw.) A large tree 50 feet high and up to 12 feet in girth, monœcious, young branchlets terete strigoso-scabrous, rugulose, leaves asperulous ovate shortly acuminate, the margin coarsely crenated, above dark-green with the costa and veins pale, beneath pale green, up to 14 inches long by about 10 inches broad, those of saplings often larger and pinnatifid, petiole cylindric ¾-1½ inches long furnished sparingly with long hairs, stipules strigose 2-3 inches long soon deciduous, peduncles axillary 2-3½ inches long, the aments covered with orbicular stipitate peltate puberulous persistent scales, the *male* linear-cylindric 3-6 inches long by 5-8 lines in diameter, the *female* oblongo-cylindric shorter and broader than the male, flowers minute very numerous papillæform a little glandular, fruit oblong papillose 6-8 inches long 3½-4 inches broad, seed subspherical white ½ an inch in diameter. *Thw. En. Pl. Zey. p.* 262.

This magnificent tree is only found in Ceylon, where it is most abundant in the southern and central parts of the island up to 2000 feet elevation, and well known by the Singalese name Del; the timber is of good quality and much in use for various purposes, such as common furniture, almirahs, &c., and boats are hollowed out of single trees.

Analysis.

The figure represents a leaf and female ament.

1 & 2. Portions of male ament.
3. A male flower shewing the solitary stamen and front view of anther.
4. Male flower cut open, shewing insertion of the stamens and back view of the anther.
5. Portion of a female ament.
6. Ovary cut vertically, shewing the single pendulous ovule.
7. Section of a portion of a female ament shewing the flowers.
8. Nearly ripe seed enclosed in the enlarged perianth (removed from the fruit.)
9. The same cut open.
10. Nearly ripe seed. (All drawn from flowers in spirits.)



Covinde, del.

Humphry, Lith.

Artocarpus nobilis (Thw.)

ULMUS INTEGRIFOLIA. (Nat. order Urticeæ.)

ULMUS, *Linn.*—GEN. CHAR. Flowers hermathrodite, or male and female, perianth membranaceous 4-8 parted, stamens 4-9, ovary ovoid sometimes pedicelled 1-2 celled, ovules solitary in the cells pendulous anatropal, styles 2 divaricato-patent stigmatose on the inner face, fruit a compressed samara winged all round 1-seeded, seed inverse, embryo exalbuminous orthotropal; radicle superior. Trees or shrubs, leaves alternate.—Holoptelæa, *Planch.*

ULMUS INTEGRIFOLIA. (Roxb.) A good sized tree, leaves ovate or ovato-cordate acute or obtuse entire glabrous shining 3-5 inches long by 1½-2 broad, stipules lanceolate caducous, flowers fascicled; male, female and hermathrodite mixed in the same fascicles, perianth deeply 4-8 parted slightly hairy, segments oval caducous, stamens 5-9 scarcely longer than the perianth, ovary pedicelled oval compressed, styles 2 as long as the ovary, fruit flat winged all round emarginate at the apex. *Roxb. Pl, Corom.* i. *t*, 78. Holoptelæa integrifolia, *Planch. Ann. des Scien. Nat. Ser.* iii. *vol.* x. *p.* 266.

A timber tree common in many parts of this presidency and in Ceylon; it is a deciduous tree and generally flowers before the young leaves appear, and consequently when quite destitute of foliage, but it is sometimes found in flower when in full foliage as in the drawing. The wood is strong and reddish in color, and much in use for building and for carts and a variety of purposes; the tree is known by the Teligu names of Nowlee and Pedda nowlee eragu; in Tamil it is called Ayàh, in Canarese Rào bija, in Marattah (Bombay presidency) Wawalee, and in Ceylon Dada hirilla.

Analysis.

1. Flower bud.
2. A male flower, 8 stamens, no ovary.
3. Hermathrodite flower, 5 stamens, stipitate ovary and stigmas.
4. Anthers, front and black view.
5. Ovary and stigmas.
6. Stigma, much magnified.
7. Ovary cut vertically, 1 pendulous ovule.
8. The suborbicular leafy fruit or capsule. (Drawn from living specimens.)

BENGAL SECRETARIAT LIBRARY.

Ulmus integrifolia Roxb.

SPONIA WIGHTII. (Nat. order Urticeæ.)

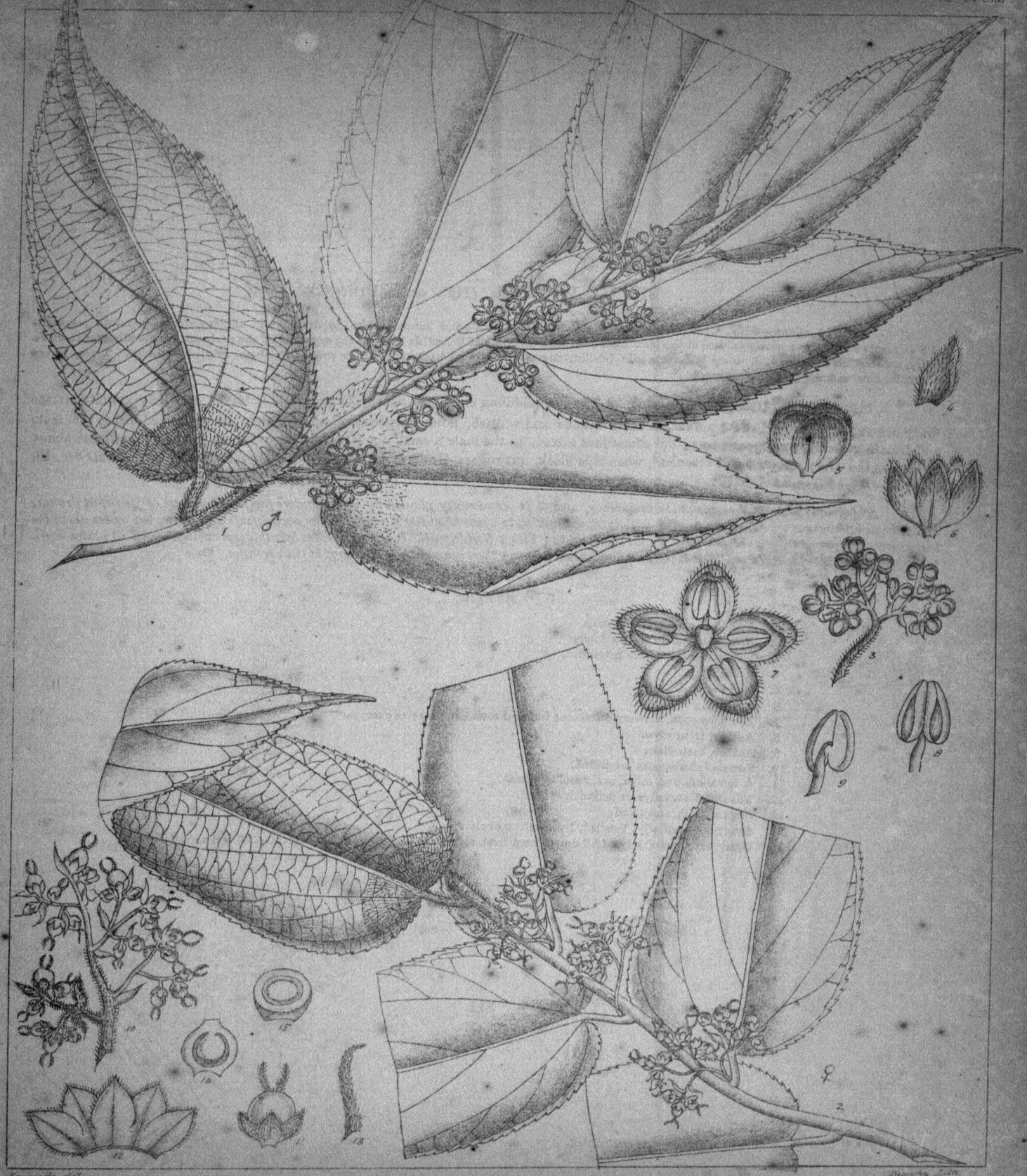
SPONIA, *Lam.*—GEN. CHAR. Flowers polygamous, male, female and hermathrodite, or diœcious in axillary cymes, perianth persistent of 5 segments imbricate or nearly valvate in the bud. Stamens exserted opposite to and as many as the segments of the perianth, surrounding an abortive ovary, anthers introrse, 2-celled, ovary globose sessile 1-celled, stigmas 2 short and plumose, drupe ovoid or globose, cotyledons folded. Trees, leaves alternate, flowers small usually numerous.

SPONIA WIGHTII. (Planch.) A small or middling sized tree not of long duration, leaves obliquely cordate serrate finely acuminate, above a little scabrous, beneath villous and whitish, flowers axillary on short 2-cleft diverging peduncles, the male and female generally on separate trees, but sometimes mixed, in the male a small obovate abortive ovary, in the females stigmas about as long as the ovary, drupe small succulent, when ripe black, nut rugose 1-celled, 1 seeded. *Planchon Ann. des Scien. Nat. Ser.* iii. *vol.* x. ;—*Wight Icones tab.* 1971

This tree is common throughout the presidency, and it is occasionally planted by coffee planters for shade because of its rapid growth, and is known to them as the Charcoal-tree ; it ascends the mountains to above 5000 feet elevation. The wood is soft and white, but makes about the best charcoal for gunpowder ; it is called in Tamil Mini, and in Teligu Gadda nelli. It is very curious how this tree springs up in all places where heavy moist forest is cleared away for coffee or other purposes, although there may not be a plant of it within miles.

Analysis

1. Branch of male tree in flower.
2. Branch of female tree in flower.
3. The male inflorescence magnified.
4. A bract.
5. A flower bud.
6. A flower.
7. The same open, shewing 5 stamens inserted round an abortive ovary.
8. Anther, front view.
9. Anther, back view.
10. Female inflorescence magnified.
11. A female flower, calyx, ovary and stigmas.
12. The imbricate calyx or perianth opened.
13. Stigma much magnified.
14. Ovary cut vertically, 1-celled, 1 pendulous ovule.
15. Ovary cut transversely. (All drawn from fresh specimens collected on the Nilgiris, 4000 feet elevation.)



Sponia Wightii (Planch.)

CELTIS TRINERVIA. (Nat. order Urticeæ.)

CELTIS, *Tournef.*—GEN. CHAR. Flowers polygamous hermathrodite and male in axillary or lateral cymes, perianth of 4-5 rarely 6 segments imbricate in the bud deciduous, stamens as many and opposite the segments incurved shorter than the perianth, anthers introrse 2-celled, ovary inserted on a hairy disk 1-celled, ovule solitary pendulous from near the apex, micropyle superior, stigmas 2 linear or oblong recurved not plumose, drupe fleshy smooth ovoid or globose, seed pendulous, cotyledons folded, albumen subgelatinous, radicle thick superior. Trees or shrubs, leaves alternate generally 3-nerved serrate or entire. *Linn. Gen. n.* 1143. Sponiocceltis, *Planchon.* Solenostigma, *Planchon.*

CELTIS TRINERVIA. (Roxb.) A good sized tree, young parts aureo-pubescent, leaves alternate obliquely-ovate subcordate at the base, with a longish acumen at the apex, in age quite glabrous on both sides, coarsely serrate in the upper half, 3½-6 inches long by 2-3¼ inches broad, prominently 3 nerved, the nerves channelled on the upper side raised and very prominent beneath, the transverse veinlets somewhat arched prominent beneath, petioles 2-4 lines long, stipules ensiform, inflorescence racemose pubescent generally on the young shoots axillary or below the leaves, perianth 4-5-merous, stigmas large spreading villous. *Roxb. Fl. Ind.* iii. 65. Celtis Roxburghii, *Planchon. Ann. Scien. Nat. Ser.* iii. *t.* x. *p.* 302.

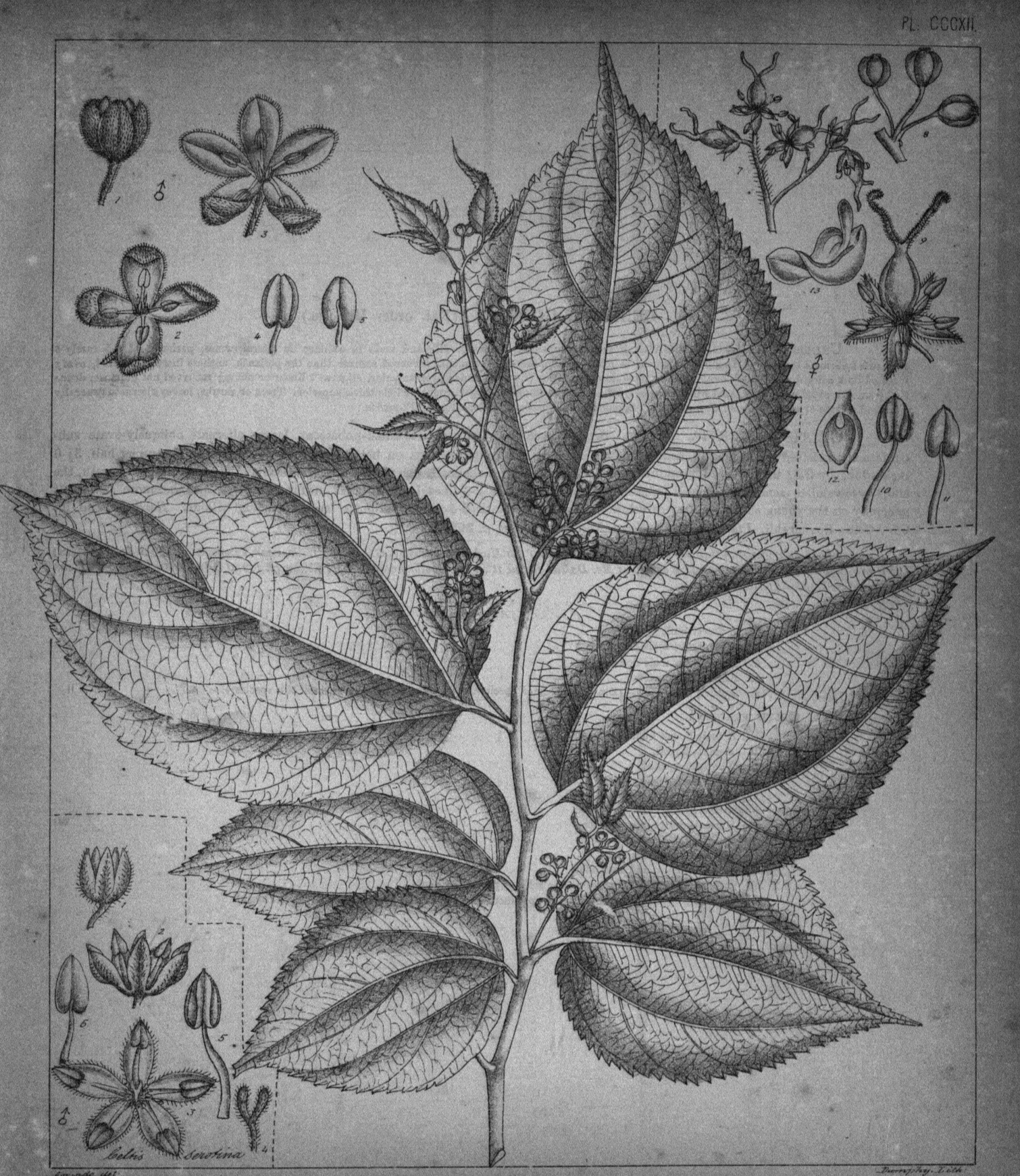
I have only met with this tree on the Eastern Ghats of the Madras presidency, Golcondah Hills, near Vizagapatam, 3000 *feet elevation; but it probably also occurs on the western coast, as Mr. Dalzell found it on the Bombay ghats. Dr. Roxburgh found it in Eastern Bengal. I am not acquainted with its timber.*

Analysis.

1. A flower bud.
2. A 4-merous male flower.
3. A 5-merous male flower.
4. Anther, front view.
5. Anther, back view. (Drawn from dried specimens. I have no fertile flowers of this species.)

2. CELTIS SEROTINA.

1. A male flower bud.
2. A male flower.
3. The same opened.
4. The abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Hermathrodite inflorescence.
8. Fruit.
9. Hermathrodite flowers.
10, 11. Anthers, front and back view.
12. Ovary cut vertically, shewing the solitary pendulous ovule.
13. Embryo. (All drawn from living specimens except 8 and 13, copied from Wight's *Icones.*)



Celtis Australis (Rich.)

GIRONNIERA RETICULATA. (Nat. order Urticeæ.)

GIRONNIERA, *Gaud.*—GEN. CHAR. Flowers small diœcious male and female, no hermathrodite, in axillary cymes or branched racemes, perianth of 4-5 segments imbricate in the bud. *Male*, stamens 4-5 opposite the perianth-segments with or without an abortive ovary, filaments slightly incurved. *Female*, no stamens present, ovary with 1 pendulous ovule, style 1, stigmas 2 long and filiform, drupe slightly compressed. Trees or shrubs, eaves alternate, stipules large free convolute covering the terminal buds (as in Ficus) deciduous —Helminthospermum, *Thw.* Nematostigma, *Planchon.*

GIRONNIERA RETICULATA. (Thw.) A large timber tree, young parts sparingly adpresso-pilose but soon glabrous, leaves very hard coriaceous ovate to oblongo-ovate generally with a long acumination, glabrous in age on both sides and shining above, 3-5½ inches long by 1½-2¾ broad, penniveined and prominently reticulated, the 9-14 primary veins on each side much raised and prominent beneath, petioles 2-4 lines long, stipules long linear-lanceolate as in the generic character. *Male* flowers in panicles axillary or between the leaves, perianth segments 5 rounded obtuse puberulous or subglabrous, abortive ovary generally wanting. *Female* flowers solitary axillary pedicellate, drupe glabrous ovoid a little compressed attenuated at the apex, 6 lines long by 4 lines broad, crowned with the remains of the stigmas. *Thw. En. Pl. Zey. p.* 268.

This valuable timber tree is found on our Ghat forests up to 3000 *feet elevation, from South Canara down to Travancore and Tinnevelly, and it also inhabits Ceylon; the wood is very hard and heavy, and is a valuable engineering timber. In Tinnevelly the tree is called Koditàni. The specimen figured was collected on the Carcoor ghat (Wynad), and as I could not find the female tree I have added dissections of both female and male from another species, the G. subæqualis.*

Analysis.

The plate gives a branch of the male tree in flower.

1. Portion of male inflorescence.
2. A male flower bud.
3. Male flower.
4. A male flower open.
5. Anthers, front and back view. (Drawn from living specimens.)

GIRONNIERA SUBÆQUALIS.

6. Branch of male tree.
7. Male flower bud.
8. Male flower open.
9. Anther, front view.
10. Anther, back view.
11. Abortive style.
12. Branch of female tree.

13 & 13*a*. Female flowers.
14 & 15. Female flowers cut vertically, shewing the solitary pendulous ovule.
16 & 17. Seed.
18. Ovule. (16, 17 & 18 copied from Blume's drawings, the rest from dried specimens.)

Govinda del.

Dampsey Lith.

Gironniera reticulata (Thw.) *Gironniera subaequalis (Planch.)*

FICUS RELIGIOSA. (Nat. order Urticeæ.)

FICUS, *Linn*.—GEN. CHAR. Flowers unisexual, minute, enclosed in a hollow globular ovoid or pear-shaped succulent receptacle called a *fig or synæcium*, the minute aperture closed by bracts turned inwards. *Male* flowers usually near the mouth of the fig. Perianth 3 to 6 lobed. Stamens usually 1 or 2, rarely more. *Female* flowers usually lining the greater part of the cavity. Perianth entire, or of 2 or more lobes or segments. Ovary 1-celled, with 1 pendulous or laterally attached ovule. Style usually lateral, with a more or less oblique variously shaped stigma. Fruiting fig usually enlarged, the enclosed seed-like nuts surrounded each by its membranous or pulpy persistent perianth. Embryo curved, in a fleshy albumen. Trees or shrubs, with the juice usually milky. Leaves alternate, or very rarely opposite, entire or divided. Figs (receptacles) solitary, or in clusters of 2 or more, axillary, or on the old wood below the leaves, usually with 3 small bracts at their base, or at the base of the pedicel. *Benth. Fl. Hong Kong p.* 326. Urostigma, *Gasparrini*.

FICUS RELIGIOSA. (Linn.) A very large tree, root spreading horizontally and near the surface, trunk up to 25 feet in girth, bark pretty smooth ash-colored, branches numerous spreading, leaves (deciduous in the cold season) alternate cordate with a very long cuspidate point 1½-2 inches long, the margins scollop-waved, glabrous on both sides and shining above, 6-7 inches long, 3-3½ inches broad, the primary veins very prominent, the veinlets beautifully reticulated, petioles round smooth slender 3-4½ inches long, stipules sheathing soon caducous, figs in axillary pairs sessile or shortly pedicellate vertically compressed, smooth, blackish when ripe with 3 bracts at their base.—Urostigma religiosa, *Gasp.*;—*Wight Ic. t.* 1967.

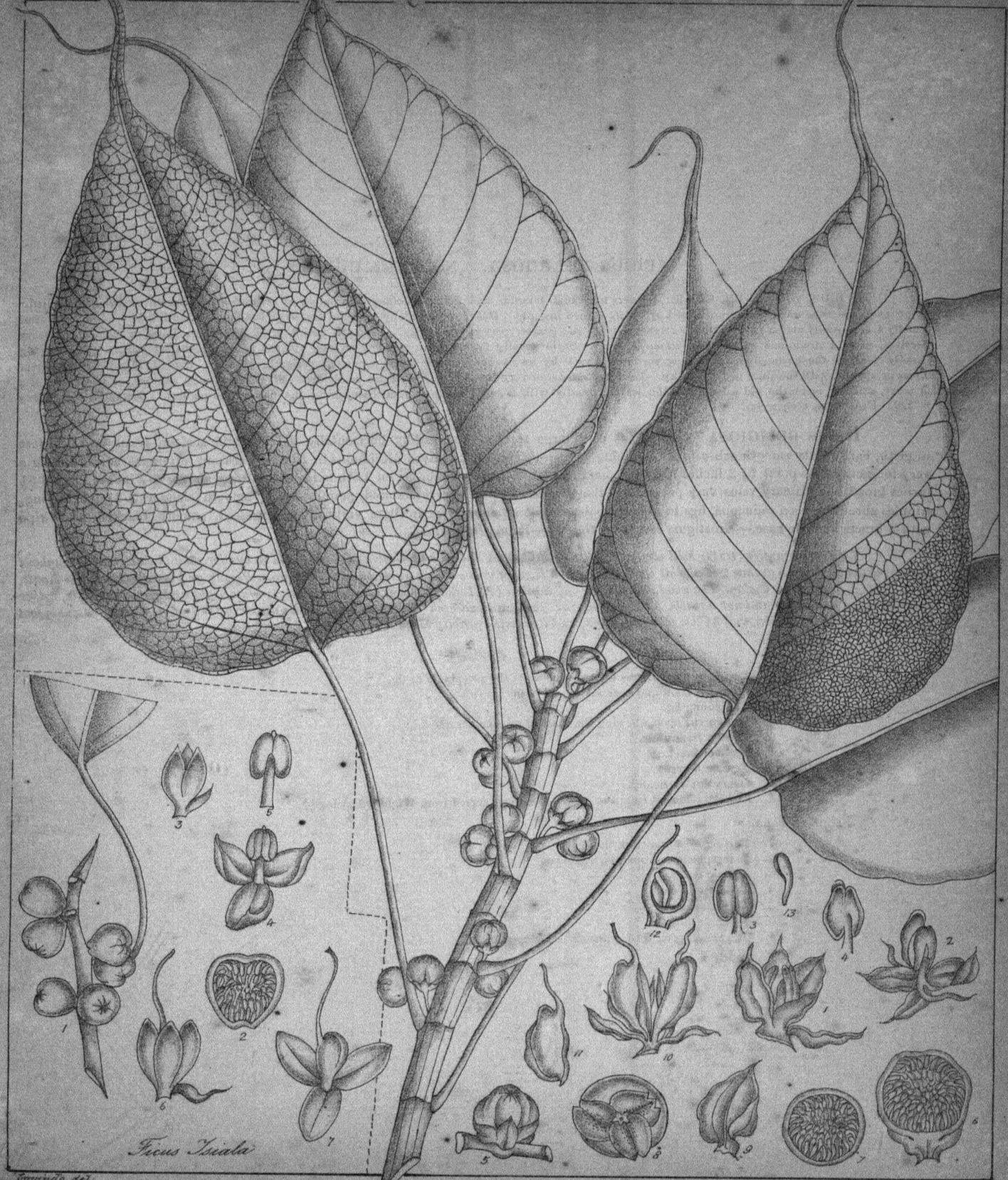
This very beautiful tree is held very sacred by the natives in India and Ceylon; it is common in our forests and cultivated throughout India, particularly as an avenue tree and as a sacred tree; it is every where known by its Hindoostani name Peepul, and is called Arasi in Tamil, Rai in Teluqu, and Bo in Ceylon. The wood, like that of the Banian (F. Indica) and most other species, is white, light and very perishable, rather coarse grained and brittle and not durable, and only fit for fuel, and bad even for that. Silk worms are very fond of its leaves. A cubic foot unseasoned weighs 40-42 *lbs., and* 34 *lbs. when seasoned, and its specific gravity is* ·544.

Analysis.

1, 2. A male floret removed from the inside of the receptacle or fig.
3, 4. Stamens, front and back view.
5. The young fig.
6 & 7. The fig cut open, shewing the mass of minute florets.
8. The fig, back view.
9. Scale or bract.
10, 11. Female floret.
12. Ovary cut vertically.
13. Embryo removed from the seed. (Analysis copied from Wight's drawings.)

FICUS TSIALA.

1. Portion of a branch in flower.
2. A receptacle or young fig cut open.
3. A male floret.
4. The same open.
5. The stamens.
6. A female floret.
7. The same open. (Drawn from living specimens.)



Ficus religiosa. (Linn.)

CYNOMETRA RAMIFLORA. (Nat. order Leguminosæ ; Sub order Cæsalpinieæ ; Tribe Cynometreæ.)

CYNOMETRA, *Linn.*—GEN. CHAR. Calyx tube obsolete or shortly turbinate, limb of 4 (or 5) segments, imbricate in æstivation, usually reflexed at flowering. Petals 5, subequal, or 2 anterior minute. Stamens 10 (or many), filaments filiform, free or very shortly cohering at base; anthers small, elliptical or rotundate, versatile, dehiscing longitudinally. Ovary sessile or shortly stipitate, style usually filiform, stigma terminal; ovules solitary or geminate. Legume obliquely ovoid obovoid or reniform, turgid or more or less compressed, usually rugose, 2 valved, 1-seeded. Seed exalbuminous ; cotyledons large, fleshy, plano-convex. Unarmed trees or shrubs. Leaves abruptly pinnate, leaflets 1-6-jugate, more or less coriaceous, 1-nerved. Stipules caducous. Flowers small, in axillary or rarely terminal racemes, often very short. Bracts dry or scarious, small, deciduous; bracteoles small sometimes petaloid, persistent.

CYNOMETRA RAMIFLORA. (L.) A middling sized spreading tree, glabrous, leaves abruptly pinnate, leaflets 1-2-pair sessile or subsessile more or less coriaceous oval to elliptic often unequal sided, subacute or obtuse at the apex, 3-6 inches long by 1½-2½ broad (the upper pair the larger) flowers white or with a tinge of rose in short dense many-flowered axillary racemes or fascicles, bracts short ovate from a broad base, the pedicels 3-4 lines long each furnished at the base with a small lanceolate bracteole, calyx at length reflexed, of 5 broad segments, petals narrow linear equal in size. Stamens 10 alternately shorter, ovary sessile hairy 1-ovuled, stigma capitate, legume very turgid ovoid to reniform very rugose and corrugated. *Linn. Sp. p.* 509 ;—*Rheede. Mal.* 4 *t.* 31.

This tree is, I believe, indigenous in Malabar and Travancore and it inhabits Ceylon. I have never myself met with it in any of our forests, and the drawings are taken from Ceylon specimens ; it is to be found in a cultivated state in gardens in this presidency. The wood possesses great strength and stiffness, and is close grained, hard and durable, but cracks and splits when exposed ; it is of a light brown color and unseasoned weighs 65 *to* 68 *lbs, and* 56 *lbs the cubic foot when seasoned, and its specific gravity is* ·896. *It is in use for house-building, carts, &c., and chips of the wood infused in water give a dark purple dye. C. cauliflora, of which I have also added analysis, is also to be met with in our gardens, but I have not seen it wild.*

Analysis.

1. Branch in fruit (life-size.)
2. Portion of a branch in flower (life-size.)
3. A portion of the inflorescence magnified.

4, 5. Bract and bracteole.

6. A flower bud.

7, 8, 9. Full flowers.

10. A petal.
11. Anther, front view.
12. Anther, back view.
13. The hairy ovary, style and stigma.
14. Ovary cut vertically, 1 ovule. (Drawn from dried specimens.)

CYNOMETRA CAULIFLORA.

1. The truncal inflorescence.
2. A flower bud and bracts.
3. Full flower.
4. Petals.
5. Anther, front view.
6. Anther, back view.
7. Ovary.
8. Ovary cut vertically, 1 ovule.
9. Ovary cut vertically, 2 ovules.
10. Fruit or legume. (Drawn from flowers in spirits.)

Cynometra ramiflora, (Linn.)

CYNOMETRA TRAVANCORICA. (Nat. order Leguminosæ; Sub order Cæsalpinieæ; Tribe Cynometreæ.)

For Gen. Char. see letter-press to Pl. cccxv.

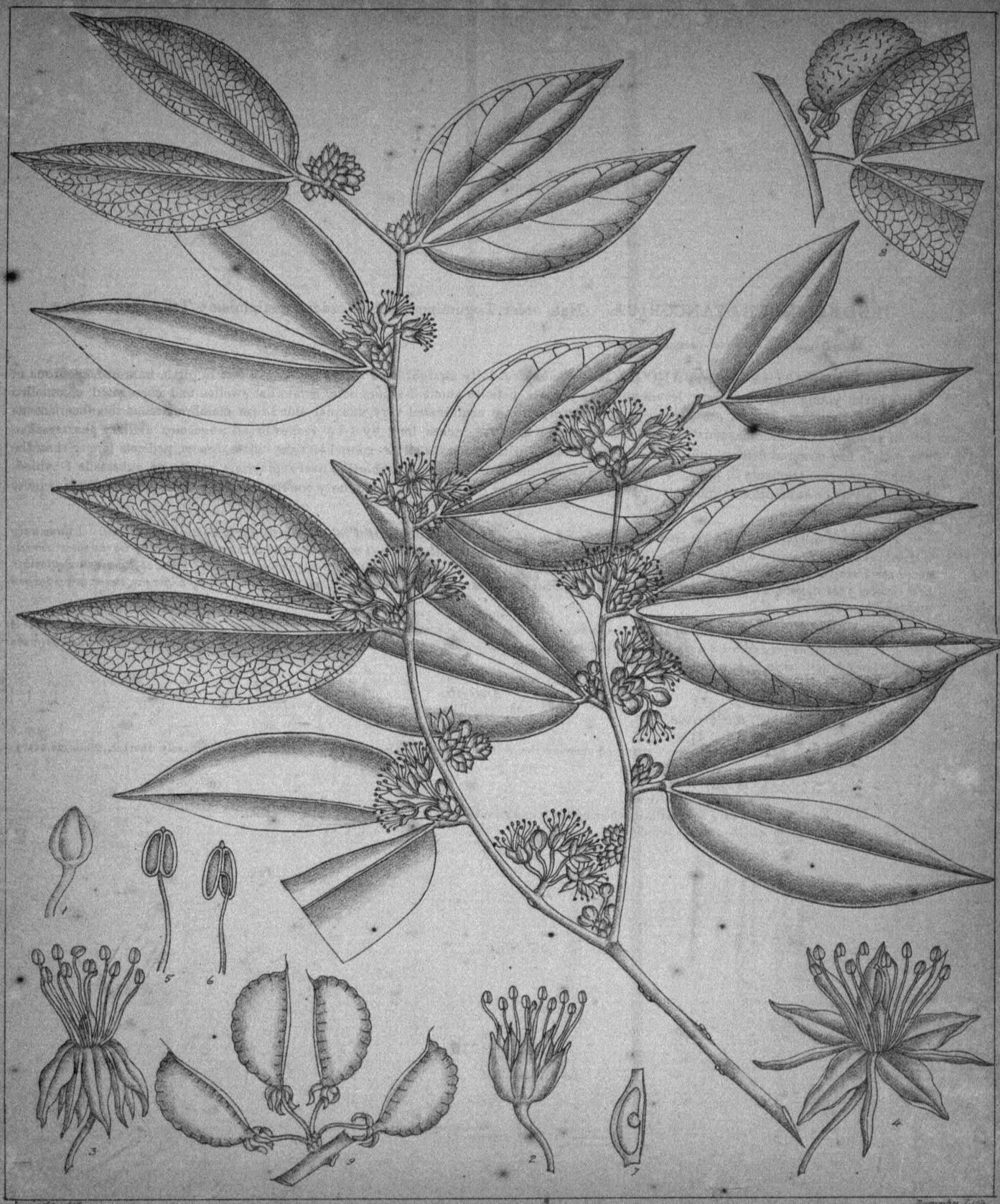
CYNOMETRA TRAVANCORICA. (Bedd.) A lofty straight tree with a trunk 5-6 feet in girth, unarmed, glabrous in all its parts, young branches terete, leaves abruptly pinnate, petioles about 3-4 lines long somewhat swollen and corrugated, channelled on the upper surface, leaflets sessile always only 1 pair, elliptic acuminated very unequal sided firm membranaceous to subcoriaceous (when young very membranaceous and of a creamy-pink color), 3-4 inches long by 1-1½ inches broad; racemes axillary shorter than the petiole few flowered densely imbricated before flowering with numerous straw-colored scariose ciliate bracts, pedicels longer than the peduncle, calycine segments 5, petals 5 narrow equal, stamens 10 alternately shorter, ovary glabrous sessile or subsessile 1-ovuled, legume falcate or subreniform apiculate flat and compressed or more or less irregularly convex but not turgid, more or less rugose or corrugate.

This is a late discovery; it is a straight tree of great height and very beautiful foliage, particularly when in young leaf. I have only met with it on the Tinnevelly and Travancore mountains 2000-3000 feet elevation, but it is most abundant there, particularly in the moist forests about the Parapett and Rosemallay Coffee Estates not far from Courtallum. Nothing is as yet known about its timber, &c., it flowers in September and October; the flowers, with the exception of the glabrous ovary, are quite those of C. ramiflora, but the legume is very different, never being turgid and the leaves differ.

I have another new species of this genus, a tree from the South Canara ghats, but the inflorescence is only in very young state, and it cannot be described as yet; it has 3 pair of small leaflets, and the very young racemes are more than an inch long and densely imbricated with the large striated bracts, as in one of Griffith's Malacca species.

Analysis.

1. A flower bud.
2. A full flower.
3, 4. The same more advanced shewing the 5 broad sepals, 5 narrow petals, 10 stamens alternately shorter, glabrous ovary, style and stigma.
5. Anther, front view.
6. Anther, back view.
7. Ovary cut vertically shewing the solitary ovule.
8, 9. Nearly ripe legumes.



Vennedo, del.

Humphry Lith.

Cynometra Travancorica, Bedd.

CALLIANDRA CYNOMETROIDES. (Nat. order Leguminosæ; Sub order Mimoseæ; Tribe Ingeæ.)

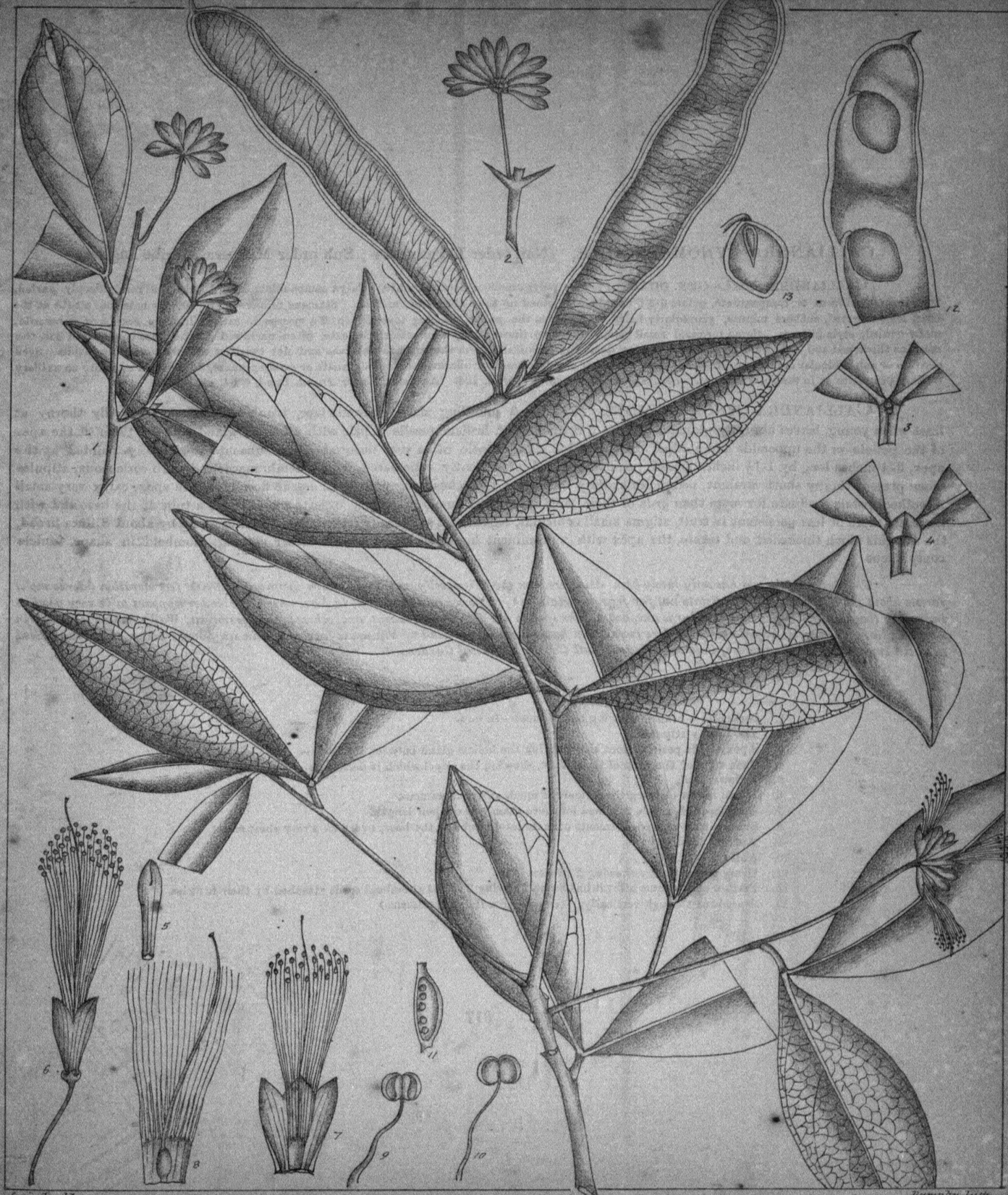
CALLIANDRA, *Benth.*—GEN. CHAR. Flowers polygamous or hermathrodite. Calyx campanulate 3-5-6-toothed or rarely deeply parted, corol infundibuliform or campanulate, petals 3-5-6 valvate and joined up to or above the middle. Stamens numerous (10-100) connate into a tube at the base, long exserted, anthers minute, glandularly-hairy or glabrous, the pollen sticking together in 2-4 masses in each cell, ovary sessile or subsessile, many-ovuled, style filiform, stigma terminal small capitate, legume linear straight or scarcely falcate, often narrowed at the base compressed flat, the margins thickened and subterete 2-valved, the valves dehiscing elastically from the apex to the base and not twisting and without pulp inside. Seed obovate or sub orbicular compressed, funicle short. Trees or shrubs, armed or unarmed, leaves bipinnate or rarely pinnate, flowers red or white on axillary solitary peduncles or in terminal racemes. *Benth. in Hook. Journ. of Bot*, ii. 138. Anneslea, *Salisb. Parad. Lond. t.* 64, not *Wall.*

CALLIANDRA CYNOMETROIDES. (Bedd.) A middling sized glabrous tree, trunk and boughs generally thorny at least when young, leaves abruptly pinnate, petioles 3-8 lines long, leaflets sessile 1 pair with a hollow gland between them at the apex of the petiole on the upperside and a stipel on the under side, elliptic often very unequal sided subacute or obtusely pointed at the apex, 3-4 inches long by 1-1½ inches broad, penniveined and prominently reticulated, from membranaceous to sub-coriaceous, stipules when present thorny short straight, peduncles axillary solitary 1-1½ inches long with 5-12 sessile flowers at the apex, calyx very small 3-toothed, petals 3 adnate for more than ⅔rds of their length, stamens numerous much exserted joined into a tube at the base and with the corol more or less persistent in fruit, stigma small orbicular, legume flat coriaceous reticulated 4-5 inches long by about 8 lines broad, the margins much thickened and terete, the apex with a prominent hook, seeds 5-6 brown rather shining, rhomboid in shape, funicle conspicuous.

This interesting tree has only lately been discovered on the Tinnevelly and Travancore mountains 25000 *feet elevation (dense moist forests about the Rosemallay Coffee Estate not far from Courtallum), in flower and ripe fruit in November; the timber appears to be very good as in most of the family. The genus is a large one, but all the species are American, except one other (the C. umbrosa, Wall) which is found in North India. The species here described differs from all in having pinnate instead of bipinnate leaves, and in its flowers being trimerous. Seed has been supplied to the Bangalore, Calcutta, Madras and Ceylon Botanical Gardens.*

Analysis.

1. Portion of a branch shewing the peduncles in bud.
2. The thorny stipules.
3. Apex of the petiole, front side shewing the hollow gland between the leaflets.
4. Back view of the apex of the petiole, shewing the stipel which is deciduous.
5. A flower bud.
6. A full flower shewing the numerous much exserted stamens.
7. Corol opened, petals 3, joined for more than ⅔rds of their length.
8. Stamen tube opened, filaments connate into a tube at the base, ovary on a very short stipe.
9. Anther, front view.
10. Anther, back view.
11. Ovary cut vertically shewing 5 ovules.
12. Portion of a legume after it has burst, shewing 2 of the rhomboid seeds attached by their funicles.
13. A seed cut through vertically. (Drawn from living specimens.)



Calliandra cynometroides (Benth.)

SARCOCEPHALUS CORDATUS. (Nat. order Rubiaceæ.)

SARCOCEPHALUS. *Afzel.*—GEN. CHAR. Flowers densely packed in a globular head, the calyxes cohering, corol-tube slender, lobes 4-5 spreading imbricate in the bud, anthers nearly sessile in the mouth of the tube ; ovary 2-celled with numerous (or few) imbricate ovules in each cell attached to the axis above the middle or near the apex, style much exserted, stigma entire or 2-lobed. Seed sessile connate into a dense globular apple-like mass, fleshy when fresh, hard when dry, but capsular at the base ; seeds numerous (or few) in each cell not winged, scrobiculate attached to the axis by fleshy gland like processes, at first all pendulous, the upper ones at length erect, albumen copious. Trees, stipules large membranous very deciduous the globular flower heads solitary terminal.—Platanocarpum, *Korth.* Nauclea, *in part Roxb.*

SARCOCEPHALUS CORDATUS. (Roxb.) A good sized tree, leaves subcoriaceous to coriaceous, softly and very finely pubescent on both sides but more so beneath (pubescence more or less stellate) ovate or almost orbicular, ovato-oblong or cordate obtusely rounded at the apex, cuneate or cordate at the base, entire, 4-12 inches long by 2¾ to 8½ inches broad, penniveined, primary veins prominent compressed above much raised beneath, stipules large broad ovate obtuse pubescent, petioles 6-12 lines long, flowers 4-5-merous yellowish, very fragrant, in dense globular terminal heads about 1 inch in diameter, calyx-segments very short gland-like clavate and emarginate, corol-tube slender 2-2½ lines long, lobes obtuse, anthers on very short filaments, style twice as long as the corol tubes, stigma large ovoid and the apex nearly entire or somewhat 2-lobed, ovules very numerous and imbricate in each cell pendulous from above the middle of the partition. Seed receptacles united into a fleshy apple-like globular mass more than 1 inch in diameter, at first much pitted and rough with the remains of the calyxes, smoother in age, seeds numerous in each cell scrobiculate attached to fleshy gland like processes, at first all pendulous much imbricate, when the fruit is fully ripe the upper ones become erect.—Nauclea cordata, *Roxb. Fl. Ind.* i. 508. Sarcocephalus cordatus, *Miq. Fl. Ind. Bat.* ii. 133. Nauclea coadunata, *Sm. in Rees. Cycl.* xxiv ;—*DC. Prod.* iv. 344.

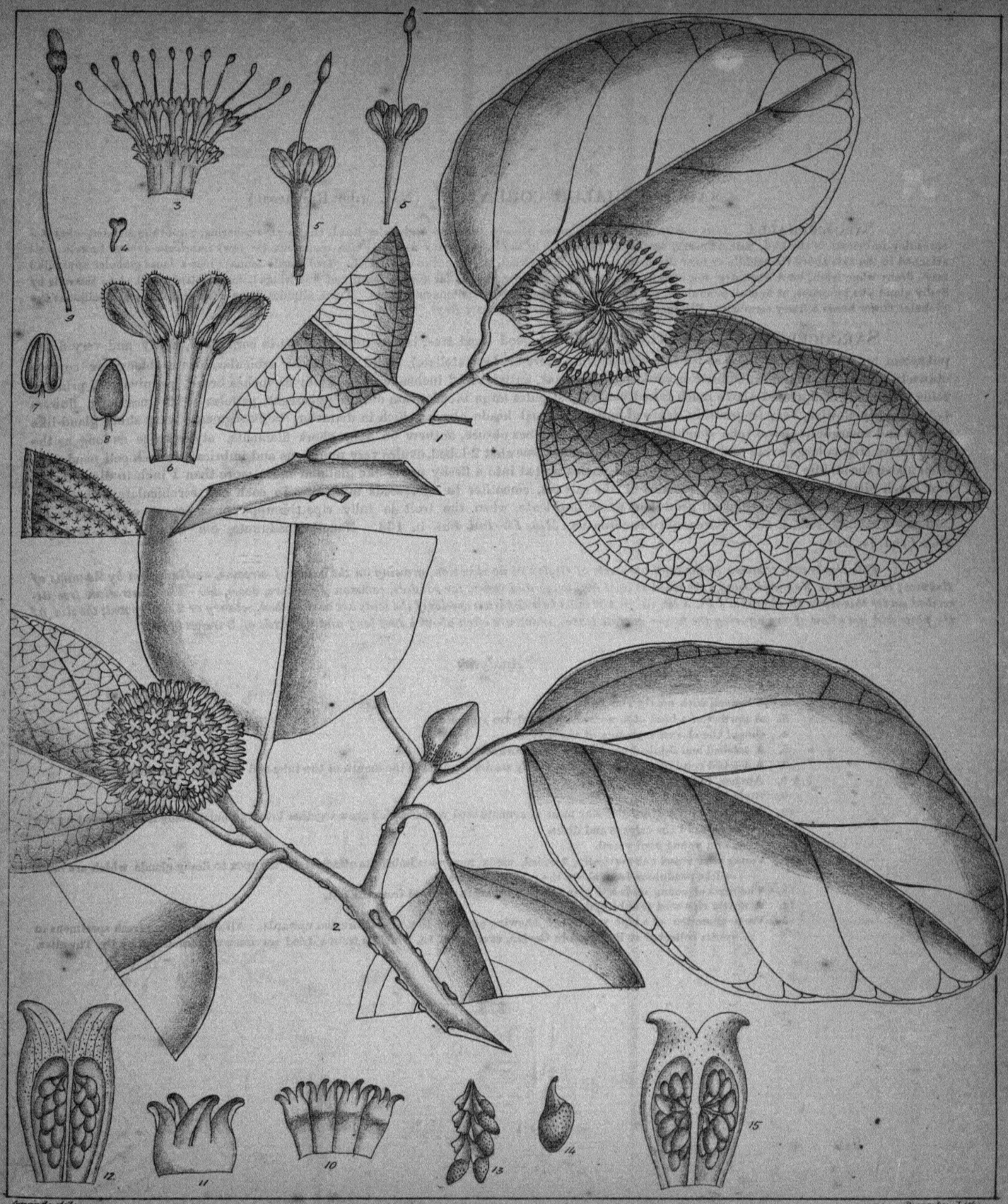
This tree is very common in the southern parts of Ceylon at no elevation, growing on the banks of streams, and is known by the name of Bakmee ; it flowers in May and June ; the wood is light and tough and in use for sandals, common furniture, doors, &c. The Australian tree described under this name in Bentham's Fl. Aust. iii. *p.* 402 *must be a different species if the seeds are as described, solitary or* 2 *superposed; the size of the plate did not allow of my figuring the larger cordate leaves, which are often about* 1 *foot long and upwards of* 8 *inches broad.*

Analysis.

1. A branch in flower.
2. A branch with nearly ripe fruit.
3. A portion of a head of flowers shewing calyxes and corols.
4. One of the clavate segments of the calyx.
5. A 4 lobed and 5-lobed corol, the lobes imbricate.
6. A 4-lobed corol open, showing the 4 nearly sessile stamens in the mouth of the tube and alternate with the segments.

7 & 8. Anther, front and back view.

9. Style and stigma.
10. A portion of the dense globular mass of connate seed vessels which grow together into a globular fleshy fruit crowned by the remains of the calyxes and disks.
11. Apex of a young seed vessel.
12. Young seed vessel cut vertically, 2-celled, seeds numerous imbricate attached at the apex to fleshy glands which are more or less pendulous from above the middle of the axis.
13. The mass of young seeds and glandular appendages removed from the cell.
14. A nearly ripe seed (scrobiculate.)
15. Vertical section of a ripe seed vessel shewing some of the seeds directed upwards. All drawn from fresh specimens in spirits collected at Badagam in Ceylon, except No. 15, which is from a dried specimen communicated by Dr. Thwaites.



Sarcocephalus cordatus (Roxb.)

SANDORICUM INDICUM. (Nat. order Meliaceæ.)

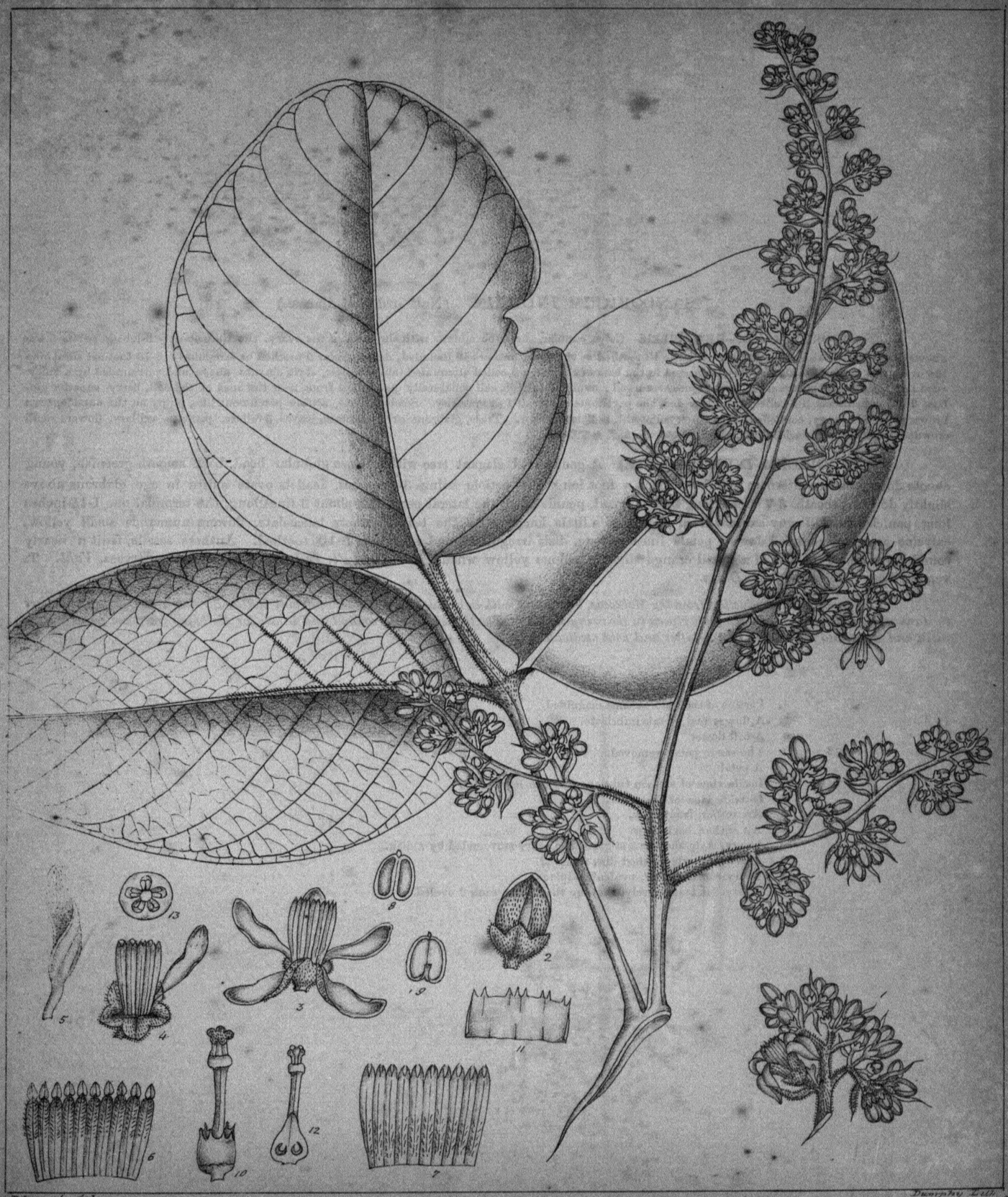
SANDORICUM, *Cav.*—GEN. CHAR. Calyx cupular, the tube adnate with the base of the ovary, the limb shortly 5-lobed, petals 5 free oblong obtuse imbricate, staminal tube cylindric 10-toothed at the apex, anthers 10 included, disk tubular 5-toothed or irregularly 8-10 toothed sheathing the ovary and base of the style, ovary immersed in the base of the calyx 5-celled attenuated into the style, style clavate above and surrounded by a thickened ring, stigmas 5 thick erect with the apices recurved; ovules 2 in each cell collaterally pendulous from near the apex of the cell, berry superior globose fleshy indehiscent 3-5-celled, cells 1-seeded, the partitions obliterated at maturity. Seeds arillate, arillus parchment like, pulpy on the outside, testa brown polished spongy, cotyledons very thick collateral, radicle superior. Trees, glabrous or tomentose, leaves 3-foliate, panicles axillary, flowers small crowded, fruit apple-like acid edible. *Cav. Diss.* vii. 359, *t.* 202-3.

SANDORICUM INDICUM. (Cav.) A good sized elegant tree with a dense globular head, bark smooth greenish, young shoots downy, leaves alternate trifoliate about a foot long, the petiole being 3-4 inches, leaflets ovate entire in age glabrous above slightly downy beneath, 5-7 inches long by 3-4 broad, penniveined, the lateral petiolules about 3 lines long, the terminal one 1-1½ inches long, panicles finely downy axillary from shorter to a little longer than the leaves, bracts lanceolate, flowers numerous small yellow, calycine segments rounded downy, petals linear oblong, disk irregularly and minutely 8-10 toothed. Anthers sessile, fruit a nearly round berry about the size of a small orange slightly villous yellow when ripe. *Roxb. Fl. Ind.* ii. 393. Trichilia nervosa, *Vahl.* T. venosa, *Spr.* Mella koetjape, *Burm.*

This tree is an introduction from the Moluccas, but is met with in a cultivated state throughout India, Birmah and Ceylon; it flowers in January and February, and the fruit ripens in the rainy season. The timber is white colored and in use for building purposes; the fruit is eaten and made into jelly. The root is bitter and used medicinally.

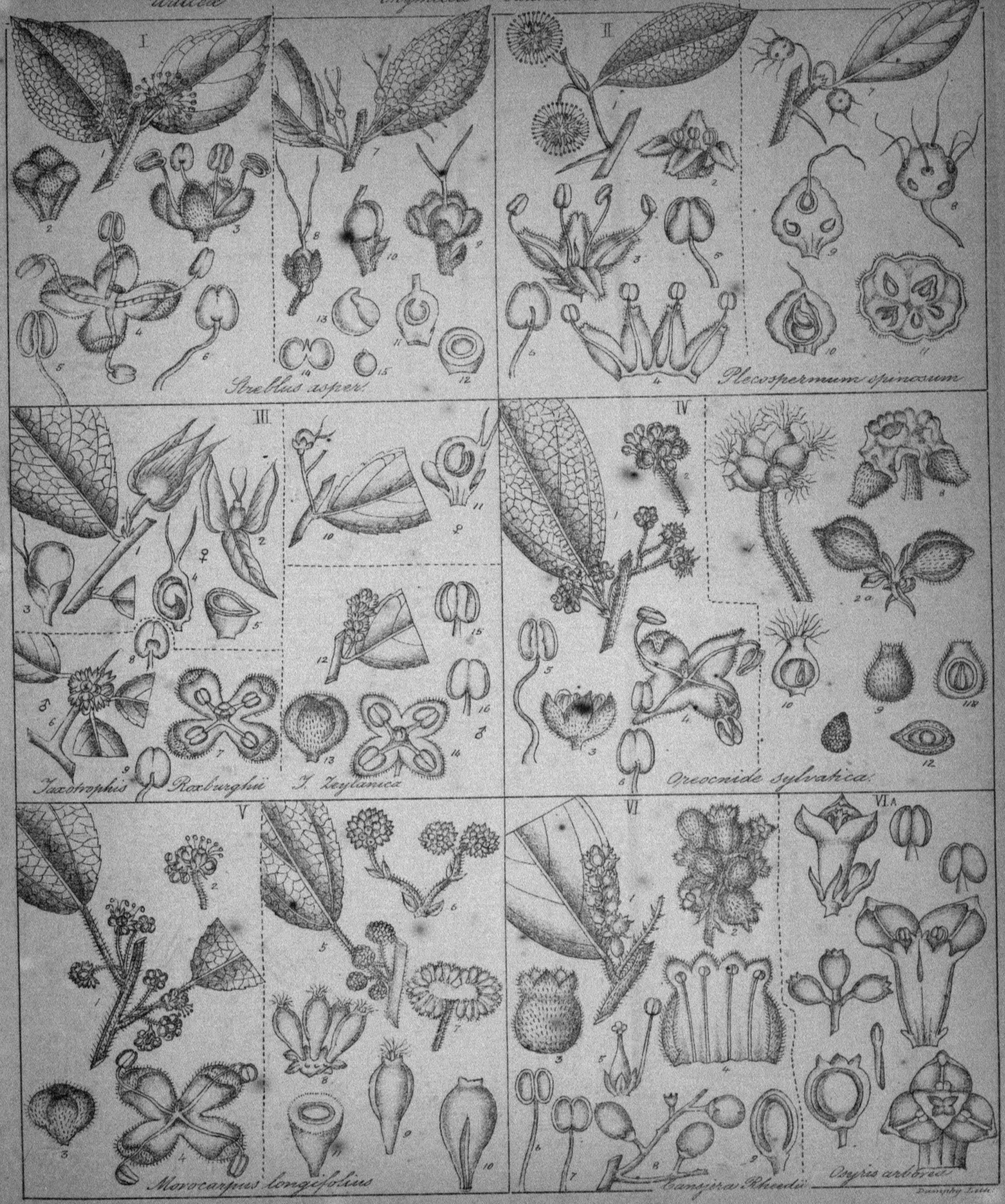
Analysis.

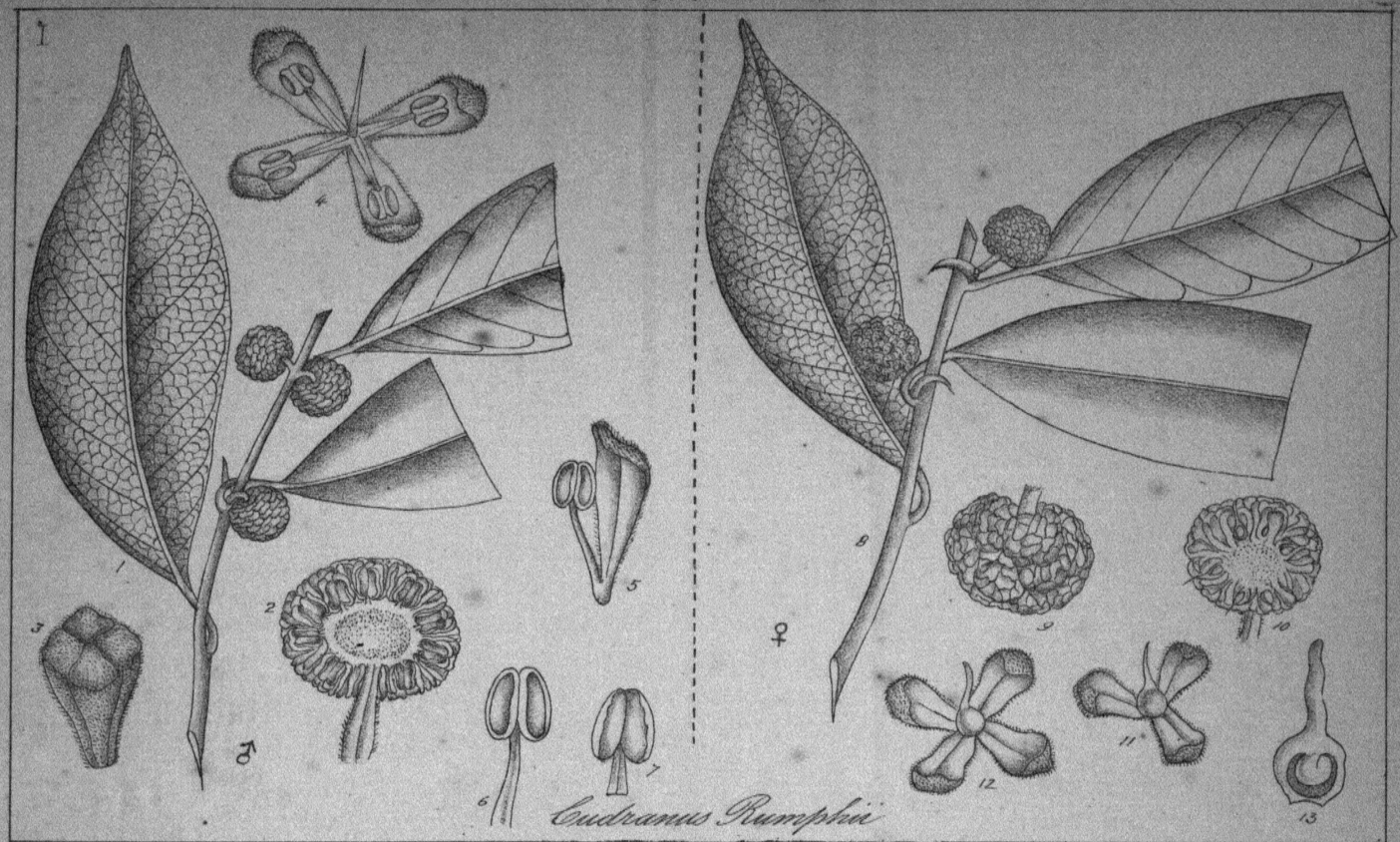
1. Portion of the inflorescence magnified.
2. A flower bud, petals imbricate.
3. A full flower.
4. The same, petals removed.
5. A petal.
6. Inside view of stamen tube shewing the 10 anthers.
7. Outside view of the same.
8. An anther, front view.
9. An anther, back view.
10. Ovary, style and the 5 stigmas, the ovary surrounded by a disk.
11. The irregularly toothed disk removed.
12. Ovary cut vertically, ovules pendulous.
13. Ovary cut transversely, shewing the 5 cells, each 2 ovuled.



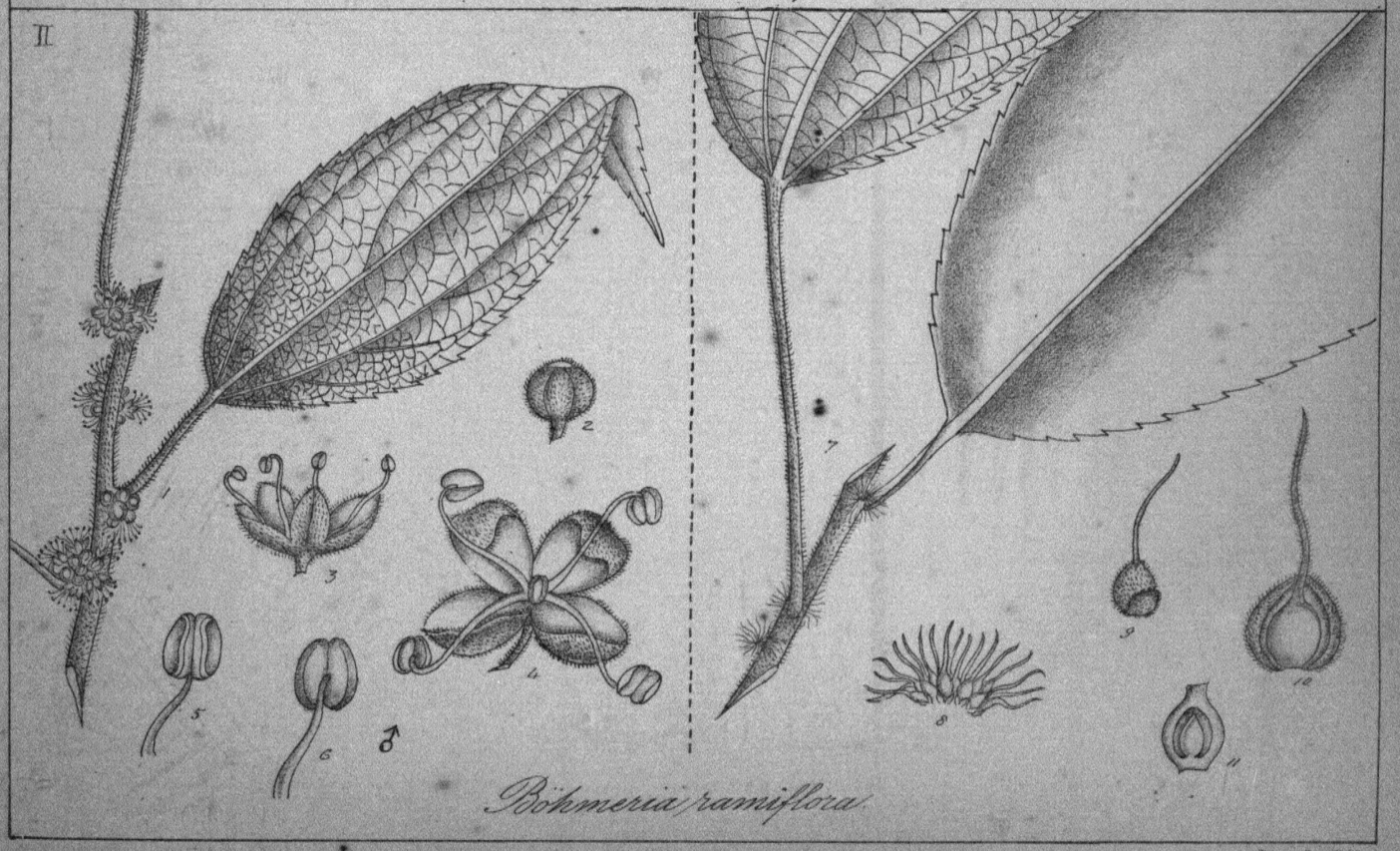
Sandoricum Indicum (Cav.)

Ulmaceæ — Thymelæaceæ — Santalaceæ





Cudranus Rumphii



Böhmeria ramiflora

Dumphy Lith.

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ORDER LXVIII—LAURINEÆ.

Perianth regular, the tube very short or none at the time of flowering, sometimes enlarged over or under the fruit or rarely adnate to the ovary and fruit; segments 4-8 generally 6, all equal or 3 outer ones smaller, imbricate in the bud. Stamens normally twice as many as perianth segments, those opposite them with introrse anthers, those within and opposite to the outer ones with the anthers extrorse in some genera, introrse in others, but in many genera 3 or sometimes all of the inner stamens, and in others 3 or all of the outer ones reduced to short staminodia or wanting, and in some flowers the stamens abnormally and irregularly increased or diminished in number; there are also frequently a pair of sessile or stipulate rather large glands, one on each side of the filament, either of the inner or rarely of the outer of the two stamens opposed to the inner perianth-segments; anthers adnate, with 2 collateral cells or 2 superposed pairs of cells, each cell opening in a valve from the base upwards or in *Hernandia* from the inner to the outer side. Ovary free, or in *Hernandia* adnate, consisting of a single carpel with one ovule suspended from the apex of the cavity from a funicle adnate to its side, or rarely with a second small abortive ovule. Style simple, often very short, with a capitate disk-shaped or obliquely dilated stigma, entire or shortly and irregularly lobed. Fruit a berry or drupe, rarely dry or nearly so, the perianth entirely deciduous, or the tube enlarged and disk-shaped or cup-shaped under the fruit or more or less succulent and closing over it or adnate to it. Seed pendulous, with a membranous or (in *Hernandia*) a hard testa, without albumen. Embryo with thick fleshy cotyledons filling the seed, enclosing the plumula and short superior radicle. Trees or shrubs, with alternate or rarely irregularly opposite leaves, more or less glandular-dotted and aromatic (except in *Hernandia*) usually entire and evergreen, or, in *Cassytha*, leafless parasitical twiners. Stipules none. Flowers usually small, in cymes reduced sometimes to clusters, umbels or heads, the cymes solitary or arranged in racemes, clusters, or panicles; or, in *Cassytha*, the flowers singly arranged in spikes or racemes.

SUB-ORDER LAUREÆ.—Anther valves opening upwards.

Tribe I, Perseaceæ.—Flowers hermathrodite (rarely polygamo-diœcious) without an involucre, or except in Beilschmiedia without imbricate scales, in panicles racemes or spikes, the inner 3 stamens extrorse, staminodia 3 in the male flowers, fruit superior naked or partly surrounded by the calyx but not included in it.

Anthers 4-celled.

Perianth or calyx wholly persistent,	
pedicel of fruit not thickened	MACHILUS.
pedicel of fruit thickened	PHŒBE.
Perianth-segments breaking off and leaving a 6 lobed or entire cup or disk under the fruit	CINNAMOMUM.
Perianth wholly deciduous	ALSEODAPHNE.

Anthers 2-celled.

Perianth wholly deciduous, fruit naked on the fleshy thickened pedicel	HAASIA.
Perianth-segments deciduous, fruit seated in the flattened base of the perianth	BEILSCHMIEDIA.
Perianth wholly persistent	APOLLONIAS.

Tribe II, Cryptocaryeæ.—Flowers hermathrodite (rarely diœcious) without an involucre or imbricated scales, in panicles racemes or spikes, the inner 3 stamens extrorse, staminodia 3 in the male flowers, fruit at length quite enclosed in the perianth. CRYPTOCARYA.

Tribe III, Litsœaceæ.—Flowers diœcious (rarely hermathrodite) in umbels or heads with a 4-6 leaved involucre or surrounded by closely imbricate scales, anthers all introrse or rarely the inner ones sub-extrorse, staminodia none in the male flowers (except occasionally in Tetranthera).

Anthers 4-celled.

Flowers in pedicellate involucres.....	TETRANTHERA.
Flowers in sessile clusters with imbricate scales or bracts at the base.	
Stamens 9 (rarely 6), fruit seated on the persistent cup-shaped base of the calyx...	ACTINODAPHNE.
Stamens 6, fruit seated on the flat scarcely dilated calyx tube, the segments persistent or deciduous.....	LITSŒA.

SUB-ORDER HERNANDIÆ.—Anther valves opening laterally ..... HERNANDIA.

This order is most abundantly represented in our western moist forests, particularly on the mountains, all the woods or sholas on which abound with members of this family. All the species are trees, always of considerable size, sometimes very large; very little is known of their timbers, but as far as I have seen, they are all of good average quality though none very superior. Three species only (two Tetrantheras and 1 Actinodaphne are found on the eastern side of the presidency, all the rest affecting the moister parts of the western side, Mysore, &c., and Ceylon; these number about 50 described species (even if all the varieties of Cinnamomum are considered as only 1 species), about 18 of which are perhaps confined to Ceylon. The genera are pretty easily distinguished, but the species, particularly those of Tetrantheru, are very difficult to make out satisfactorily, and are at present involved in much perplexity. Copious specimens of each species, with fruit as well as flowers of both sexes, are essential, and these are often not procurable at one and the same time, and herbarium specimens are often sadly deficient. I have not therefore attempted to unravel the species of the genus Tetranthera in this work, and though I have several new species in that and other genera, I shall not attempt to describe them here. The genus Cinnamomum is abundantly represented from the sea level up to 8000 feet, and there are some 6 or 7 varieties the extremes of which are well marked, but I find that they run too much one into another, and after many attempts to keep up several species, and after an observation of the different species extending over many years, I am inclined to view them all as only varieties of Cinnamomum Zeylanicum (or the true cinnamon of commerce).

The Persæa gratissima, the Alligator or Avocado pear of the West Indies, is an introduced tree in gardens in this presidency, and the Cinnamomum camphora, or true camphor tree of China and Japan, has also been introduced on the Nilgiris.

Tetranthera monopetala, Roxb., and T. laurifolia, var. Roxburghii, have been introduced into our gardens (in the plains) from Bengal, but both I believe occur on our Eastern Ghats and the latter in Tinnevelly.

The Sub-order *Cassytheæ* not coming within the scope of this work, yields leafless parasitical twiners (Cassytha.)

MACHILUS. Rumph.

For Gen. Char. see letter-press to Pl. cclxiv.

1. Machilus macrantha, *Nees.*—For description, &c. see Pl. cclxiv.

Five other species of this genus are found in Northern India.

PHŒBE. Nees.

For Gen. Char. see letter-press to Pl. ccxcii.

1. Phœbe Wightii, *DC.*—For description, &c. see Pl. ccxcii.

2. Phœbe lanceolata, *Nees.*—A middling sized or small tree, young shoots sericeous, leaves often somewhat verticelled chartaceous or submembranaceous, lanceolate or oblongo lanceolate with a long fine acumination, generally much attenuated at the base, 3 9 inches long by 1-2½ broad, glabrous above in age, minutely hairy beneath and more or less glaucous, penniveined, the veins and costa rather prominent beneath, immersed above, petiole 3-10 lines long, corymbs axillary and terminal long peduncled but generally shorter than the leaves, slightly sericeous or subglabrous as is the inflorescence, stamens all hairy, fruit 7 lines long, calyx in fruit 3 lines long. *Nees. in DC. Prod.* xv. *p.* 34;—*Wight Icones. tab.* 1821. (not good). Wight's figure, 1819, of Apollonias Arnottii would answer well for this plant except that the anthers are 2-celled. My specimens correspond well with specimens from Assam, except that the corymbs are on longer peduncles in the latter.

A common tree in the Wynaad, Anamallays and Tinnevelly mountains at 3000 feet elevation; I am not acquainted with its timber.

CINNAMOMUM. Burm.

For Gen. Char. see letter-press to Pl. cclxii.

1. Cinnamomum Zeylanicum, *Breyn.*—For description, &c. see Pl. cclxii.

Meissner (in DeCandolle's Prodromus) describes 5 species of this genus as indigenous to Southern India, viz.: 1, C. Wightii; 2, sulphuratum; 3, Perottetii; 4, Zeylanicum; and 5, iners. Of Zeylanicum he makes 3 varieties, viz.: commune, inodorum and microphyllum; and of iners 2 varieties, trinerve and subvenosum, and from Ceylon he describes 4 additional species, viz.: multiflorum, litsœfolium, citriodorum and ovalifolium, and a 3rd variety of iners, viz. dubium. I am acquainted with all these supposed species, and though the varieties differ very much in the pubescence, and texture size and shape of the leaves (the latter varying from narrow linear and lanceolate to oblong or ovate) and in the length of the panicles, number of the flowers, &c., individuals are subject to much variation, and the forms run so one into another that it is impossible to lay hold of any permanent characters to distinguish them by, and I have long ago learnt to look upon them all as varieties of only 1 species. Sulphuratum, common in Wynaad, Coorg, western slopes of the Nilgiris, &c., is a curious form, with the leaves densely clothed on both sides with yellowish tomentum, but other forms approach this in their pubescence.

Of C. (camphora) cecidodaphne, *DC.*, a penniveined species said to be found in Malabar, I know nothing, and believe that it is not a South Indian species.

ALSEODAPHNE. Nees.

For Gen. Char. see letter-press to Pl. ccxcvii.

1. Alseodaphne semicarpifolia, *Nees.*—For description, &c. see Pl. ccxcvii.

HAASIA. Bl.

For Gen. Char. see letter-press to Pl. ccxcviii.

1. Haasia Wightii, *Nees.*—For description, &c. see Pl. ccxcviii.

2. Haasia oppositifolia, *Thw.*—A tree 50-60 feet high, glabrous, leaves coriaceous glabrous of the same color on both sides opposite oblong or oblongo-lanceolate, obtusely acuminate, the costa and veins prominent on both sides, veinlets much reticulated, narrowed at the base, 4 8 inches long by 1½-3 inches broad, petiole 4-8 lines long, panicles axillary or congested into a terminal corymb shorter than the leaves many-flowered, fruit oblong 8-9 lines long 3 lines broad, seated on the thickened truncate pedicel which is 1-2 lines in length. *DC. Prod* xv. *p.* 61. Apollonias Zeylanica, *Thw. En. Pl. Zey. p.* 253.

Ceylon, central provinces, up to 4000 feet elevation. Probably not distinct from No. 1.

BEILSCHMIEDIA. Nees.

For Gen. Char. see letter-press to Pl. cclxiii.

1. Beilschmiedia fagifolia, *Nees.*—For description, &c. see Pl. cclxiii.

Two other species inhabit Northern India.

APOLLONIAS. Nees.

For Gen. Char. see letter-press to Pl. ccxci.

1. Apollonias Arnottii, *Nees.*—For description, &c. see Pl. ccxci.

CRYPTOCARYA. R. Br.

For Gen. Char. see letter-press to Pl. ccxcix.

1. Cryptocarya Wightiana, *Thw.*—For description, &c. see Pl. ccxcix.

DeCandolle gives 2 other species as inhabiting the Peninsula, viz. Stocksii and Neilgherriensis, but I do not know these if distinct from C. Wightiana.

2. C. membranacea, *Thw.*—A middling sized tree, leaves oblong or rarely ovato-oblong, abruptly acuminate acute and a little oblique at the base, slightly paler beneath, subglabrous membranaceous, 2½-7 inches long by 1-2¾ inches broad, veinlets reticulated on both sides, petioles 3-4 lines long, panicles axillary short few-flowered slightly ferruginous, fruit oblongo-ovoid ecostate black-purple about 7 lines long. *Thw. En. Pl. Zey. p.* 254.

Ceylon, Saffragam district, up to 2000 feet elevation.

C. floribunda and amygdalina are species found in Northern India.

TETRANTHERA. Jacq.

For Gen. Char. see letter-press to Pl. ccxciii.

This genus, as now understood, includes Cylicodaphne of *Nees* and Lepidadenia, *Bl.*, which only differ in the perianth tube being more enlarged and more concave or cup shaped under the fruit than in the original Tetranthera.

Meissner (in DeCandolle's Prodromus) makes 24 species, besides varieties, as inhabiting South India and Ceylon, viz. :—

1.	Tetranthera tomentosa	Peninsula, India, and Ceylon.
	var. glabrescens	Canara.
2.	T. laurifolia	
	var. Roxburghii	Peninsula, India, and Ceylon
	var. citrifolia	Do.
	var. platyphylla	Canara.
3.	Tetranthera ligustrina	Peninsula, India.
	var. celastroides	Nilgiris and Ceylon.
4.	T. velutina	Peninsula, India ?
5.	T. micrantha	Do. ?
6.	T. glauca	
	var. elongata	Do.
	var. lævigata	Courtallum.
7.	T. lœta	
	var. glauca	Ceylon.
8.	T. venulosa	Peninsula, India.
9.	T. Wightii	Do.
10.	T. nervosa	Ceylon.
	var. coriacea	Do.
	var. chartacea	Do.
11.	Tetranthera longifolia	Do.
12.	T. Hookeriana	Do.
13.	T. oleoides	Peninsula, India. ?
14.	T. cordifolia	Do.
15.	T. Panamonja	Courtallum.
16.	T. glabrata	Dindigul Hills.
17.	T. (Cylicodaphne) Wightiana	Peninsula, India, and Ceylon.
	var. tomentosa	
	var. glabrescens.	
18.	T. (C.) Zeylanica	Ceylon.
19.	T. (C.) rigida	Do.
20.	T. (C.) sebifera	Nilgiris.
21.	T. (C.) oblonga.	
	var. Stocksii	Canara.

22.	T. (C.) Thwaitesii	Ceylon.
	var. ovalifolia	Do.
	var. parvifolia	Do.
	var. angustata	Do.
23.	T. (C.) Walkeri	Do.
24.	T. (C.) myristicæfolia	
	var. acutata	Canara.

I have a very large collection of specimens of this genus from all parts of this presidency and from Ceylon, but many of my specimens are incomplete, wanting fruit, or flowers of one or other sex, &c., and I have utterly failed at making a satisfactory determination of the limits of the species, so I will not here attempt a description of the different species, as it would only add to the confusion. I feel certain, however, that the 24 species enumerated above will have to be very considerably reduced. I have figured one of our commonest species, viz., T. Wightiana; this is a most variable species as to the size and shape of the leaves, amount of pubescence, number of the parts of the flower, &c., and I feel certain that T. zeylanica, T. rigida and T. floribunda may be included under it, and if I do not confound 2 species, it has also occasionally hermathrodite flowers, and T. sebifera, *Bl.* (Lepidadenia Wightiana, *Nees*; *Wight's Icones tab.* 1837) and perhaps T. myristicifolia and some others, may probably be only varieties. Staminodes are occasionally present in the male flowers though there were none in the particular tree figured, and I did not like to run the risk of mixing up two distinct species by figuring flowers from other specimens; the inner anthers are introrse subextrorse or almost extrorse.

ACTINODAPHNE. Nees.

For Gen. Char. see letter-press to Pl. ccxcv.

Actinodaphne angustifolia, *Nees.*—A large tree, branchlets lanate, leaves coriaceous in age, membranaceous when young in verticels of 5-7, from narrow lanceolate to obovate lanceolate obtusely acuminate densely sericeous or villous when young at length glabrous above, glaucous beneath and villous on the costa and veins, 4-9 inches or even more long by 1¼-3 broad, penniveined, petioles 6-10 lines long, umbels fascicled very shortly pedunculate sericeous, common peduncle 2-3 lines long or sub obsolete, partial pedicels 1-2 lines long elongating slightly in fruit, berry globose size of a pea. *Nees in DC. Prod.* xv. 214;—*Wight Icones* 1841.

A common tree in almost all our western moist jungles up to 4-5000 feet elevation, also in Bengal. I am not acquainted with its timber. Analysis of the male flowers are given in Pl. ccxcv.

2. Actinodaphne salicina, *DC.*—For description, &c. see Pl. ccxcv.

The tree here figured is the *var. β* abbreviata, *DC. Prod.* xv. 212. *Var. β* has the leaves 5-6 inches long by 8-12 lines broad, and has many more primary veins. I have this latter only from the west slopes of the Nilgiris.

3. Actinodaphne stenophylla, *Thw.*—A tree 20-30 feet, branchlets puberulous, leaves 4 6 verticellate linear-lanceolate obtuse very minutely reticulate and pitted on the upper side, a little narrowed at the base, glabrous above in age, very glaucous beneath, 2-6 inches long by 3-10 lines broad, petioles 2-5 lines long, fascicles aureo-pubescent 4-8 flowered, pedicels equalling the calyx, calyx 1½ lines long, lobes 6 deciduous, berry globose 3 lines in diameter. *Thw. En. Pl. Zey. p.* 256;—*DC. Prod.* xv. *p.* 212.

Ceylon, in the Oovah and Badulla districts up to 3000 feet elevation.

4. Actinodaphne elegans, *Thw.*—A small tree, branchlets and petioles sparingly hairy with longish brown hairs, leaves 3-5 verticellate, linear lanceolate to elliptic, generally with a very long gradual fine acumination, glabrous or subglabrous in age, minutely reticulated and pitted, very glaucous beneath, 2½-6 inches long by 1-1½ inches broad, petioles 3 5 lines long, inflorescence and fruit exactly as in A. stenophylla. *Thw. En. Pl. Zey. p.* 256.

Ceylon, central provinces and in the Pasdoon corle up to an elevation of 3000 feet. These 3 last species are very closely allied, and may be only varieties of one plant; elegans is more glaucous beneath, but is scarcely distinguishable in the shape of the leaf from salicina var. α, but the pubescence on the young ramuli is different from both that and stenophylla, though the pubescence of salicina β. abbreviata is nearly the same. DeCandolle describes an A. Thwaitesii, which I have not seen, but it is made up from specimens referred by Thwaites to elegans and stenophylla.

5. Actinodaphne glauca, *Nees.*—A tree 20-30 feet high, young branches and petioles fusco tomentose, leaves 5-7 verticellate rigid coriaceous elliptic or obovate oblong obtuse or rounded at the apex, minutely scrobiculate reticulate, glabrous and glaucous, the young ones hoary beneath, 2-2½ inches long by 12-14 lines broad, primary veins 8-10 on each side rather prominent, petioles 6-7 lines long, peduncles 2-3 lines long, calyx 6 parted 3-4 lines in diameter in expansion (stamens in the male and staminodes in the female, &c., as in salicina fig. ccxcv.), fruit subspherical seated in the crenulated cup-like base of the calyx. *DC. Prod.* xv. 213.

Ceylon, on the Pedrotalagalle 7000-8000 feet elevation.

6. Actinodaphne molochina, *Nees.*—A small tree, young branches ferruginous, leaves 5-6-verticelled rigid coriaceous oval obovate, oblong or nearly orbicular obtuse or rarely acute, above glabrous and shining, beneath rufo-tomentose, 2 3½ inches long by 1-2 inches broad, penniveined, the primary veins 5-7 on each side prominent on both sides, petiole thick 2-3 lines long, flowers fascicled in small sessile dense rufo-sericeous heads as in the preceding species. *DC. Prod.* xv. 211;—*Wight Icones* 1843. A. molochina and Moonii, *Thw. En. Pl. Zey.* 257-256.

Var. α. glabrescens, leaves sub-rotundo-oval oblong or lanceolate penniveined, at length subglabrous and glaucous beneath.—A. Moonii, *Thw.*

Var. β subtriplinervia, leaves subrotund or obovate, obtuse, penniveined, but occasionally spuriously 3-nerved—A molochina, *Thw.*

Ceylon, *var. α.* central provinces, 5000-7000 feet elevation.

var. β. Pedrotalagalle, 6000-8000 feet elevation.

7. ACTINODAPHNE SPECIOSA, *Nees.*—A showy tree, 30-40 feet high, young branches and young leaves very densely rufo-lanate, leaves 3-4 verticellate very rigid coriaceous ovate to lanceolate, shortly acuminate or obtuse, in age glabrous bullate and shining above, glaucous and villous beneath, penniveined or rarely subtriplinerved, primary veins 4-5 on each side and with the reticulated veinlets impressed above much raised beneath, 4-10 inches long and up to 8 inches broad, petioles 10-14 lines long, flowers fascicled in small sessile dense villous heads as in the preceding species. *Nees.*;—*DC. Prod.* xv. 219.

Var β. leaves less coriaceous, sparingly hirsute, ovato or oblongo-lanceolate acuminate acute at the base, 3-6 inches long by 2-4 inches broad.—A Candolleana, *DC. Prod.* xv. 219.

Ceylon, central provinces, up to 8000 feet; *var. β.* at 4000 feet elevation.

DC. considers the latter a distinct species.

8 ACTINODAPHNE HOOKERI, *DC*—For description, &c. see Pl. ccxcvi.

I know nothing of A. lanata described in *DC. Prod.* xv. 219 as a Nilgiri and Ceylon tree, and it is not mentioned by Thwaites in his *Enumeration.*

I have a fine new species from the South Canara ghats, a lofty tree called Nettee, but my specimens are too imperfect for description.

LITSŒA. JUSS.

For Gen. Char. see letter-press to Pl. ccxciv.

1. LITSŒA ZEYLANICA, *Nees.*—For description, &c. see Pl. ccxciv.

L. foliosa, *Nees*, oblonga, *Nees*, scrobiculata, *Nees*, and other species have already been joined with this, and after a careful study and dissection of orbicularis, *Thw*, fuscata, *Thw*, and ambigua, *Meissner*, I cannot satisfactorily distinguish these species, and believe them to be all varieties of Zeylanica. Orbicularis, which form I also have from the Peninsula, only differs in its leaves being nearly orbicular, and fuscata only differs in being furnished with pubescence; these 2 may rank as varieties distinguished by these peculiarities, but I can find nothing to distinguish ambigua.

HERNANDIA. PLUM.

For Gen. Char. see letter-press to Pl. ccc.

1. HERNANDIA PELTATA, *DC.*—For description, &c. see Pl. ccc.

In Northern India the genera Nothaphœbe, Endiandra, Dodecadenia and Polyadenia are each represented by one tree; the genus Lindera has 5 species, Apenda 2, and Daphnidium 6; and in Birmah the genus Dictyodaphne yields 1 species. None of these 8 genera are represented in Southern India.

ORDER LXIX—EUPHORBIACEÆ.

Flowers always unisexual, either without a perianth in one or both sexes, or more frequently with a simple calyx-like perianth, or sometimes also with 4 or 5 petals alternating with the calyx-lobes. Stamens various. Ovary consisting of 3 or sometimes 2 or more than 3 united 1-celled or rarely 2-celled carpels, each with 1 or 2 generally pendulous ovules. Styles as many as carpels, free or more or less united, entire or divided, the stigmatic surface usually lining their inner face. Fruit either capsular, separating into as many elastically 2 valved cocci as carpels, leaving a persistent axis, or succulent and indehiscent, the endocarp consisting of as many indehiscent nuts or cocci as carpels. Seed laterally attached at or above the middle, with or without an arillus. Embryo straight, with flat cotyledons and a superior radicle in a fleshy albumen, or very rarely the cotyledons fleshy, and little or no albumen. Trees, shrubs, or herbs, often abounding in acrid milky juice. Leaves alternate or opposite, rarely divided or compound, usually with stipules. Inflorescence very varied. Flowers usually small.

Tribe I, Phyllantheæ.—Ovary cells 2-ovuled, segments of the calyx in the male flower imbricate.

Tribe II, Briedelieæ.—Ovary cells 2-ovuled, segments of the calyx in the male flowers valvate.

Tribe III, Crotoneæ.—Ovary cells 1-ovuled, anthers incurved in the bud.

Tribe IV, Acalypheæ.—Ovary cells 1-ovuled, anthers erect in the bud. Segments of the calyx in the male flower valvate, involucre when present unisexual.

Tribe V, Hippomaneæ.—Ovary cells 1-ovuled, anthers erect in the bud. Segments of the calyx in the male flower imbricate, involucre when present unisexual.

Tribe VI, Euphorbieæ.—Ovary cells 1-ovuled, anthers erect in the bud, segments of the male calyx imbricate (generally obsolete), flowers (monandrous) involucrate, involucre bisexual.

Tribe I, PHYLLANTHEÆ.

Monœcious or occasionally diœcious (in Actephila).
- Flowers petalous ... ACTEPHILA.
- Flowers apetalous.
  - Stamens central.
    - Disk present ... PHYLLANTHUS.
    - Disk none.
      - Male perianth-lobes not inflected ... GLOCHIDION.
      - Male perianth-lobes inflected, seed arillate ... MELANTHESOPSIS.
      - Male perianth-lobes inflected, seed exarillate ... BREYNIA.

Diœcious.
- Stamens central, fruit a drupe... PUTRANJIVA.
- Stamens not central.
  - Male flowers not in catkins.
    - Stamens inserted round the rudiment of an ovary.
      - Leaves simple.
        - Fruit a dry capsule.
          - Leaves alternate... SECURINEGA.
          - Leaves verticelled or opposite ... MISCHODON.
        - Fruit fleshy baccate... BACCAUREA.
      - Leaves trifoliate ... BISCHOFFIA.
    - Stamens inserted round a central disk, rudiment of ovary none or very small.
      - Ovary 1-celled ... HEMICYCLIA.
      - Ovary 2-4 celled... CYCLOSTEMON.
  - Male flowers in catkins.
    - Ovary 2-celled, styles or stigmas 2 ... APOROSA.
    - Ovary 1-celled, styles or stigmas 3-4 ... ANTIDESMA.

Tribe II, BRIEDELIEÆ.

- Fruit not capsular ... BRIEDELIA.
- Fruit a capsule.
  - Seed impressed at the hilum, cotyledons thin folded ... CLEISTANTHUS.
  - Seed not impressed at the hilum, cotyledons thick, not folded ... LEBIDIEROPSIS.

Tribe III, CROTONEÆ. ... CROTON.

Tribe IV, ACALYPHEÆ.

Petalous.
- Male calyx-segments valvate but bursting irregularly ... ALEURITES.
- Male calyx-segments regularly valvate
  - Petals of the male twice as many as the sepals ... AGROSTISTACHYS.
  - Petals of the male equal in number to the sepals ... SARCOCLINIUM.

Apetalous.
- Stamens inserted round a broad central disk ... CŒLODISCUS.
- Stamens inserted round the rudiment of an ovary.
  - Anthers attached by the middle of the back, cells adnate ... CEPHALOCROTON.
  - Anthers pendulous, cells distinct ... CŒLODÆPAS.
  - Anthers attached by the base, cells adnate ... SYMPHYLLIA.
- Stamens central, not polyadelpous.
  - Anthers 2-celled.
    - Fruit fleshy indehiscent, stamens mixed with glands ... PODADENIA.
    - Fruit a drupe with 3-4 hard cocci, stamens without glands ... TREWIA.
    - Fruit capsular ... MALLOTUS.
  - Anthers 4-3 celled.
    - Connective produced ... CLEIDION.
    - Connective not produced ... MACARANGA.
- Stamens central polyadelphous, no rudiment of ovary, female calyx imbricate, seed not carunculate ... HOMONOYA.

Tribe V, HIPPOMANEÆ.

Petalous.
- Stamens central.
  - Fruit a drupe with a hard 1 seeded nut... GIVOTIA.
  - Fruit a capsule
    - Receptacle in the male flower not elevated.
      - Seed not carunculate ... TRIGONOSTEMON.
      - Seed carunculate ... JATROPHA.
    - Receptacle in the male flower elevated.
      - Diœcious, both sexes with petals, seed ecarunculate ... OSTODES.
      - Monœcious, female flowers often apetalous, seed carunculate ... CODIŒUM.

Apetalous.
- Stamens inserted round the rudiment of an ovary ... CHŒTOCARPUS.
- Stamens central.
  - Stamens numerous ... GELONIUM.
  - Stamens 2-3 ... EUCŒCARIA.

Tribe VI, EUPHORBIEÆ... ... ... EUPHORBIA.

Genera allied to EUPHORBIACEÆ ... ... DAPHNIPHYLLUM, SARCOCOCCA.

This is a very large order, and of much importance in a forest view, most of the genera yielding large trees ; very little is known of the timber of many of its representatives. The following trees are known to yield very valuable timber. Phyllanthus emblica, Putranjiva Roxburghii, Bischoffia Javanica, Briedelia retusa, Hemicyclia elata, and Mischodon Zeylanicus ; the 4 first of these are very common and widely distributed throughout the whole of this Presidency ; the fifth is, I believe, confined to our Western Ghats and the sixth to Ceylon. Mallotus Philippinensis is valuable on account of the dye powder yielded by its capsules. Some genera yield soft worthless timbers, such as Trewia, Macaranga, Givotia.

The genus Glochidion is a very large one, and is represented by trees from the sea level up to the tops of our highest mountains. Daphniphyllum and Sarcococca are also found up at 6000 and 8000 feet elevation, and Actephila and Excœcaria at 5-6000, but the others are rarely seen much above 4000 or 4500, though Sarcoclinium and Phyllanthus emblica, Cephalocroton Indicum, and one or two species of Aporosa and Antidesma occasionally come up to 5000 or rather higher.

Our moist Western Ghat forests up to 4000 feet abound with Actephila, Baccaurea, Cyclostemon, Aporosa, Agrostistachys, Sarcoclinium, Cœlodepas, Cephalocroton, Cleidion, Trigonostemon, Ostodes, Codiœum, Excœcaria, Glochidion, Hemicyclia, Antidesma, Croton and Mallotus, the first twelve of which are genera confined to our moister forests, but the last six genera are represented all over the presidency. The genera Melanthesopsis, Breynia, Putranjiva, Securinega, Briedelia, Cleistanthus, Lebidieropsis, Trewia, Macaranga, Homonoya, Givotia, Gelonium and Euphorbia affect our drier forests on both sides of the presidency, and are seldom to be seen in the moister or evergreen tracts of the west side.

The genera Cœlodiscus, Bodadenia, Chœtocarpus and Mischodon are as far as we yet know confined to Ceylon. Melanthesopsis has not been figured as it only differs from Breynia in the seed being arillate, and Cœlodiscus and Symphyllia are quite unknown to me.

Of genera yielding undershrubs or herbaceous plants only, and not coming within the scope of this work, there are in Phyllanthæ, Agyneia and Sauropus ; in Acalypheæ, Acalypha, Crozophora, Tragia and Claoxylon ; in Hippomaneæ, Jatropha, Baliospermum and Sebastiania. The genus *Ricinus* (Castor-oil plant) near Homonoya in Acalypheæ, is an introduced plant in this presidency ; it is largely cultivated, and has run quite wild in waste places, &c. Jatropha curcas, a common hedge plant, is an introduction from Tropical America.

Phyllanthus is a very large genus, and the following genera are now only considered as sections or subgenera of it. Chorizandra, *Wight*, Peltandra, *Wight*, Kirganelia, *Juss*, Cicca, *Linn.*, Prosorus, *Dalz.*, Eriococcus, *Hassk.*, (Reidia, *Wight*) Most of the species are small undershrubs or herbs and are not described in this work.

Only 7 genera occur in N. India and Birmah, which are not represented in the Peninsula. In Phyllantheæ, *Andrachne* yields one shrub in North India and *Hymenocardia* one tree in Birmah. In Acalypheæ, *Sumbavia* and *Cocococras* each yield 1 small tree in Birmah, *Alchornea* 2 small trees or shrubs in North India and 1 in Birmah, and *Cnesmone* 1 shrub in North India. In Hippomaneæ, *Microdesmis* yields a shrub in Birmah

I have followed J. Müller's excellent new arrangement of the order in every particular, except that I have kept up Glochidion as a genus instead of amalgamating it with Phyllanthus, and I have removed Mischodon, which is a 2-ovuled genus, from Hippomaneæ to Phyllantheæ.

Moacurra gelonioides, *Roxb.*, is referred by Müller to the tribe Phyllantheæ. I have followed Hooker and Bentham in placing it under the genus Chailletia in the order Chailletiaceæ.

TRIBE I.—PHYLLANTHEÆ.

ACTEPHILA. BLUME.

Calyx 5-6-lobed imbricate, petals as many alternate with the calyx-segments, disk 5-6 lobed, the lobes opposite the calyx-segments. *Male* stamens 5-6 inserted round the rudiment of an ovary, the receptacle not raised, connate below or free, anther-cells divaricate extrorse, rudiment of ovary 3-cleft each division bifid. *Female* staminodes none, ovary 3-celled, cells 2-ovuled, styles 3 each bifid, fruit a capsule, 3-coccous, shells 2-valved, cocci with 1-2 seeds in each, seeds exarillate, exalbuminous, radicle minute, cotyledons thick unequal. Trees or shrubs, leaves alternate simple penniveined entire glabrous, stipules deciduous, flowers monœcious or diœcious axillary, the males short peduncled crowded, the females solitary and on longish peduncles. *Bl. Bijdr. p.* 581. Anomospermum, *Dalz. in Hook. Journ. of Bot.* 1851, 228. Savia, *Baillon.*

1. ACTEPHILA EXCELSA, *Dalz.*—A small tree or large shrub, monœcious or occasionally diœcious, leaves from narrow lanceolate-elliptic to oblongo-elliptic or more or less obovate, acute at both ends sometimes acuminate at the apex, entire coriaceous or subcoriaceous shining glabrous paler beneath, 3½-8 inches long by 1-2½ broad, venation penniveined with large marginal loops, petioles 3-18 lines long, stipules squamæform acuminate from a broad base glabrous or hairy, male flowers crowded in the axils subsessile, female larger and on longish (8-10 lines) peduncles, generally solitary in the axils with the males or in separate axils in the same plant, or male and females on separate plants ; calyx-lobes rounded glabrous or hairy, petals lanceolate or obovate very much smaller than the calyx-lobes, styles 3-bifid or rarely subhexagynous, capsule glabrous about 1 inch in diameter depressed globose. *Dalz. l. c.* Actephila Neil-

gherrensis, *Wight Icones tab.* 1910 ;—*Thw. En. Pl. Zey. p.* 280. A. excelsa and Zeylanica, *DC Prod* xv., *Sec. post p.* 222 *and* 221. Savia Zeylanica *Baillon.*

Common in our moist Ghat forests from Canara down to Cape Comorin up to 5500 feet, also in Ceylon, Sylhet and Khasya ; a very variable plant, sometimes a tree, often only a small shrub. My South Tinnevelly specimens have very much narrrower leaves than the Nilgiri and Malabar forms.

Analysis, Pl. XXIII, fig. 3.

1. Portion of a branch with only male flowers in the axils, leaves removed (life size).
2. A male flower-bud, sepals imbricate hairy.
3. A full male flower, stamens 5 connate below round the abortive ovary, 5 small petals.
4, 5. Stamens, front and back view.
6. A segment of the calyx.
7. A petal.
8. Apex of the abortive style.
9. Branch with female inflorescence (life size.)
10. Female flower, sepals imbricate, hairy.
11. A full female flower, styles 3 each 2-cleft with blunt stigmas (in some flowers I found the styles divided to the base, *i. e.*, hexagynous.)
12. Ovary cut vertically, ovules pendulous from near the apex of the axis.
13. Ovary cut transversely, 3 cells, each 2-ovuled.
14. A valve of the capsule, shell double.
15. A seed. (Drawn from living specimens collected on the western slopes of the Nilgiris at 3500 feet elevation ; the specimens figured were diœcious, it is more commonly monœcious ; one female flower in each axis with the males.)

2. Actephila Thomsonii, *Müll.*—A small tree or large shrub, diœcious, leaves rhomboid-obovate obtusely cuspidato-acuminate, cuneate and narrowed at the base, calyx-segments of the female linear-lanceolate acute furnished at the base inside with a row of glands, petals linear-lanceolate rigid entire nearly 3 times shorter than the calyx, peduncle of the female slender elongate 3-flowered. *DC. Prod.* xv. 222.

Mysore and Carnatic. This species is unknown to me ; it differs from the last in its 3-flowered female peduncles and in the calyx.

PHYLLANTHUS. Linn.

For Gen. Char. see letter-press to Pl. cclviii.

Anthers 5.

Anther-slits vertical, filaments unequally connate, the 2 *exterior nearly free.* Sec. Kirganelia.

1. Phyllanthus reticulatus, *Poir.*—A large straggling shrub, branches slender, the younger ones slightly pubescent or quite glabrous, leaves alternate distichous oval ovate or elliptic entire, ½ to 1½ inches long by 4-5 lines broad, petioles 1-2 lines long, flowers axillary aggregated several males and usually 1 female, calyx 5-cleft, disk of 5 glands, filaments 3 unequal the centre one erect and 3-androus the 2 lateral ones filiform oblique and each bearing 1 anther. Stigmas minute equal in number to the cells of the ovary, berry depressed umbilicate dark purple succulent 6-12 celled. *Poir. Dict. Encycl.* 5 *p.* 298 ;—*DC. Prod.* xv. 344. Anisonema multiflora, *Wight Icones* 1899. Phyllanthus multiflorus, *Willd.* Kirganelia multiflora, *Baillon.* Phyllanthus, *Roxb. Flora Ind.* iii. 664.

This shrub is common throughout the plains of India and Ceylon, in hedges, banks of water courses, waste places, &c ; it is also found in the Philippines and in Africa. In Ceylon it is called Welkyla. Its root is medicinal and sold in our bazaars ; the bark yields a reddish brown dye.

* * *Anthers* 2-4.

Male calyx 5-6 *parted.* Sec. Phyllanthus.

2. Phyllanthus emblica, *L.*—For description, &c. see Pl. cclviii.

3. Phyllanthus polyphyllus, *Willd.*—A small tree or large shrub, stipules triangular lanceolate, leaves linear obtuse mucronate densely approximated, margins recurved, glabrous, 3-6 lines long by about 2 lines broad, flowers fascicled, the male very short pedicelled the female longer, the disk in the male of 5 distinct glands, in the female annular, ovary globose, the column of styles slender, styles thin elongated bifid, capsule dry about the size of a pea trisulcate. *Willd. Sp. Pl.* iv. 586 ;—*DC. Prod.* xv. 352 ;—*Wight Icones tab.* 1895. ii. P. taxifolius, *Don. Prod. Fl. Nep. p.* 63. P. emblicoides, *DC. l. c.* 353. P. Lawii, *DC. l. c.* 353.

Common about the foot of the Nilgiris, and all along the west side of the Presidency, Mysore, &c. and in Ceylon. It has much the appearance of P. emblica, but the small dry fruit at once distinguishes it.

4. Phyllanthus juniperinoides, *Müll.*—A large glabrous shrub, floriferous branchlets very small 3-5 fascicled from the axils of a pair of black spines on the main stem, leaves about 3 lines long by 1 line broad, oblongo ovate mucronate or acuminate sub-cordate at the base, stipules linear lanceolate from a broad base subscariose twice as long as the petioles, flowers subsolitary in the axils shortly pedicelled, disk in the male of 5 glands, in the female annular and 6-lobed, staminal column entire, anthers oblong apiculate,

ovary glabrous, styles 3 distinct erect bifid the branches compressed reflexed, capsule subglobose very small 2-3 lines in diameter *DC. Prod.* xv. *p.* 358. P. spinulosus, *Wall. Cat.*

Common in beds of rivers inWynaad and Coorg, also in the Concan ; well distinguished by the hard thorny protuberances on the main stems, in the axils of which the small floriferous branchlets (looking much like pinnate leaves) are fascicled.

Male calyx 4-parted. Sec. CICCA.

§ *Flowers monœcious fruit a drupe.* Sub. Sec. EUCICCA.

5. PHYLLANTHUS DISTICHUS, *Linn.*—An elegant small tree, branchlets approximated numerous scattered round the extremities of the branches 1-2 feet long, leaves numerous alternate short petiolate the largest about the middle of the branchlets the lowermost nearly orbicular gradually lengthening to oblong smooth entire waved rather glaucous beneath, 1-3 inches long by 1-1½ inches broad, sometimes there are male flowers in the axils of the upper leaves. Stipules minute, flowers very numerous small reddish collected in globular heads at the old axils after the leaves have fallen, male female and hermathrodite mixed,but the male much the most numerous, calyx of 4 orbicular concave spreading segments, disk of 4 glands, filaments 4 erect shorter than the calyx, ovary ovatê, style scarcely any, stigmas 3 4 spreading 2-cleft, drupe fleshy 3-4 lobed 6-8 grooved, as large as a gooseberry.—Cicca disticha, *L. Mant. p.* 124. Phyllanthus longifolius, *Roxb. Fl. Ind.* iii. 672.

This tree is common in gardens and about waste places near villages, &c., but I never saw it in our forests ; its fruit is eaten raw, pickled, and preserved, the root is purgative. The tree is called Herfaroori in Hindustani and Aruuelli in Tamil ; when the lateral short flowering branchlets are leafless they look quite like racemes.

§ *Flowers diœcious, fruit a dry capsule.* Sub. Sec. PROSORUS.

6. PHYLLANTHUS INDICUS, *Dalz*—A small tree, diœcious, leaves penniviened entire oblongo-elliptic elliptic-lanceolate membranaceous, 2-4½ inches long by 1-2 broad, petioles 2-5 lines long, stipules broad lanceolate obtuse subcoriaceous 1½-2 lines long ; male flowers very numerous fascicled 1½ lines broad, disk convex or flat, pedicels 3-4 lines long, female flowers in threes, pairs or solitary, pedicels 4-5 lines long, styles 3 long flat reflexed bifid at the apex. Capsule subglobose depressed 5 lines in diameter, seed shining purplish-blue. *Dalz. in Hook. Journ. of Bot.* iv. 346 ;—*DC. Prod.* xv. 417.

Coorg (Samàjee ghat), Wynaad, and elsewhere in our moist western forests up to 3000 feet, also on the Bombay ghats and in Ceylon ; the timber is white and tough and used for building purposes.

Analysis, Pl. XXIV, fig. 6.

(Under the subsectional name of Prosorus).

1. Portion of a branch shewing male inflorescence.
2. A male flower bud, sepals 4 imbricate.
3. A full male flower, disk 4-lobed slightly convex, stamens central 4.
4 & 5. Anthers, front and back view.
6. Female inflorescence, the pedicels are here solitary in the bracts ; they are often twin or tern.
7. A female flower, 4 sepals. disk, ovary and 3 distinct flat recurved styles.
8. Ovary cut vertically, ovules sub pendulous.
9. Ovary cut transversely, 3 cells each 2-ovuled.
10. A fruit

7. PHYLLANTHUS CYANOSPERMUS, *Gærtn*—A small tree, leaves somewhat rhomboidio-elliptic, male flowers 3 lines in diameter, disk concave adnate with the tube of the calyx, pedicels 4-5 lines long, female flowers always solitary, pedicels 5-8 lines long ; the rest as in Indicus—Croton ? cyanospermum, *Gærtn. de Fruct. vol.* ii. *p.* 120 *t.* 107. Prosorus, *Thw. En. Pl. Zey. p.* 281. Phyllanthus, *DC. Prod.* xv. 417.

This is very closely allied to the last but can be distinguished by its male flowers being double as large. The female flowers in *Indicus* are generally in threes, but sometimes solitary as in this species. I hardly think that the 2 are more than varieties. DeCandolle describes a third supposed species of this section from the Bombay ghats, under the name of P. Stocksii, which he says is intermediate between Indicus and cyanospermus ; the description of this would answer well for some of my specimens of Indicus.

GLOCHIDION. FORST.

For Gen. Char. see letter-press to Pl. cclxxvii.

SEC. 1. EUGLOCHIDION.—*Calyx segments* 6-5 *equal, or more or less unequal : stamens generally* 5-(*rarely* 4-8), *ovary* 15-4 *celled.*

§ 1. *Style-column distinctly conical narrowed above.*

A. Ovary-cells 12-10.

1. GLOCHIDION LITTORALE, *Bl.*—A small tree, branches glabrous, leaves orbicular or ovato-elliptic or broadly obovate, obtusely rounded acutish at the base, submembranaceous, beneath brownish glabrous, male pedicels short, female flowers subsessile, male calyx and pedicels glabrous, the inner segments shorter oblongo-elliptic obtuse, anthers 5-6, segments of female calyx broadly elliptic obtuse glabrous, ovary 12-10 celled subpubescent. Column of styles shortly conical from a broad base not quite as long as the ovary

12-10 sulcate glabrous; stigmas emarginato-retuse at the apex, capsule a little depressed, slightly many-sulcate, puberulous at the apex *Bl. Bidj. p.* 585. Phyllanthus littoralis, *DC. Prod.* xv. 280.

Malabar, near the coast.

B. Ovary-cells 8-5.

a. Ovary glabrous.

2. Glochidion Zeylanicum, *Juss.*—A small tree, branchlets glabrous or subglabrous, stipules triangular ovate acuminate rigid recurved persistent, leaves oblongo-elliptic obtuse or shortly acuminate often slightly cordate at the base, 3-6 inches long by 2 inches broad, primary veins 10 on each side; flowers rather numerous in the axils of the leaves, fascicles often shortly peduncled and supra-axillary, segments of the male calyx broad ovate obtuse, one of the inner ones sometimes furnished with 2 auricles at the base, stamens 5-6, segments of the female calyx subrotund or broadly ovate obtusely rounded, ovary 7-4 celled globose glabrous, column of styles conical at length equalling the ovary in length, 7-4 lobed at the apex, lobes emarginate. Capsule ovoid-globose slightly depressed scarcely sulcate. *Ad. Juss. Tent. Euph. p.* 107. Phyllanthus Zeylanicus, *DC. Prod.* xv. 281. Bradleia, *Gærtn. de Fruct.* ii. *p.* 12.

South Canara, Ceylon, up to 2000 feet elevation.

3. Glochidion nitidum, *Roxb.*—A small tree, trunk erect with a large shady head, ramuli glabrous, leaves subsessile oblongo-ovate acute unequal at the base glabrous, shining above pale beneath, brownish green, 4-8 inches long, stipules small acute, inflorescence very shortly pedunculate a little above the axils, male and female flowers mixed, the former few and larger pedicelled, the latter numerous, calyx-segments 6 ovate acute, anthers 5-7, ovary 5-6 celled glabrous, style-column conical truncate the apex 5-6-fid, lobes emarginato-bilobulate, capsule depresso-globose, 10-12 sulcate.—Bradleia nitida, *Roxb. Fl. Ind.* iii. 699.

Canara and Malabar, and also on our Eastern Circar mountains and in the Bombay Presidency.

β. Ovary sericeous.

4. Glochidion lanceolarium, *Roxb.*—A small or middling sized tree, glabrous, ramuli triangular above, leaves short petioled elliptico-lanceolate or oblongo-elliptic, acute at both ends, rigid shining, 3-6 inches long by 1-2 inches broad, veins not conspicuous, male flowers fasciculate long peduncled, female glomerate sessile, male calyx-segments 6 lanceolate subacute and narrowed at the base, anthers 4-6, female calyx-segments oblongo-ovate the inner ones smaller. Ovary 8-6-celled subglobose sericeous, style-column conical truncate a little longer than the ovary 8-6 toothed at the apex, capsule subglobose depressed turnip shaped sulcate. —Bradleia lanceolaria, *Roxb. Fl. Ind.* iii. *p.* 697. Phyllanthus, *DC. Prod.* xv. 282. Glochisandra acuminata, *Wight Icones* 1905.

Malabar, Canara, also in the Bengal and Bombay presidencies; the wood is hard and durable, the tree is called Bhoma on the Bombay ghats.

C. Ovary-cells 5-4.

5. Glochidion tomentosum, *Müll.*—A large shrub or small tree, ramuli obscurely fusco-pubescent, leaves ovate or elliptic acute slightly cordate at the base, sparingly pubescent above tomentose beneath, 2-4 inches long by 1¼-2 inches broad, flowers fasciculate, pedicels 2-3 times as long as petioles subtomentose, female calyx 4-6 partite, exterior segments broadly ovate, interior narrow elliptic. Stamens 5, ovary 5-4 celled sericeo-tomentose 6-angled at the base, column of styles conical short thick about as long as the ovary 5-4 lobed at the apex and there sericeo-tomentose. *DC. Prod.* xv. 283.

Malabar, Concan, and South Canara (Sampajee ghat).

§ *Style-column cylindric in its whole length, much narrower at its base than the apex of the ovary, and not distinctly broader upwards. Ovary 6-5 celled glabrous.*

6. Glochidion Canarum, *Müll.*—A small tree or large shrub, young branchlets 3-angled glabrous, stipules much recurved persistent, leaves glabrous oblongo-obovate, or oblongo-ovate or oblongo-elliptic, acute obtuse or slightly cordate at the base or subacute, pale above beneath brownish, primary veins 6-8 on each side, flowers fascicled, stamens 4, female calyx 4-6-parted gradually running into the pedicel, segments oblongo-ovate rather unequal truncato-obtuse or subacute, ovary 5-6 celled glabrous, style-column cylindric rather slender 6-cleft at the apex much narrower and nearly twice as long as the ovary, capsule nearly 4 lines broad globose depressed at the apex and base scarcely sulcate, rostrate with the persistent style-column.

South Canara and Mysore.

Sec. II. Hemiglochidion.—*Calyx* 6-5-*parted, stamens* 3, *ovary* 7-3-*celled.*

§ 1. *Style-column depresso or deplanato-ovoid, about as broad or broader and often shorter than the ovary, not constricted at the base*

* *Calyx of female* 6-*toothed, ovary glabrous.*

7. Glochidion brachylobum, *Müll.*—A small tree, rigid very glabrous, branchlets angled. Stipules coriaceous broad obliquely triangular-ovate acute 3 times shorter than the petioles, leaves ovate or obovate or broad-elliptic obtusely acuminate unequal sided at the base, glabrous rigid and thick, about 4-5 inches long by 2-2¼ inches broad, petioles about 4 lines long rigid. Male and female

flowers mixed, the former long the latter short-pedicelled, male calyx 6-parted glabrous, the connective elongate, female rather irregularly 6-lobed obovoid adpressedly pubescent, ovary 3-celled depresso-obovoid glabrous, style-column thick broad obovoid 8-sulcate nearly twice as long and broad as the ovary, glabrous, capsule 4-4½ lines broad subglobose, and a little depressed 3-coccous, 6-sulcate.—Phyllanthus brachylobus, *DC. Prod.* xv. 288. G. coriaceum in part (*c. p.* 3016), *Thw. En. Pl. Zey. p.* 285.

Ceylon, central provinces, 3-4000 feet elevation.

8. GLOCHIDION HOHENACKERI, *Mull.*—A tree, quite glabrous, leaves 2-3½ inches long by 7-8 lines broad, ovate lanceolate acuminate or subcuspidate, rather rigid more or less shining above, male flowers pedicelled, female sessile, calyx of the female 4-toothed, ovary depresso-globose 4-celled glabrous, style column much depressed thick a little broader and shorter than the ovary, deeply cruciately 4-cleft, male pedicels 2½ lines long, 2-3 times longer than the petioles, male calyx 6-parted, segments oblongo-elliptic obtuse, capsule 2½ lines broad 2 lines long, depressed 4-coccous, 8-sulcate, crowned by the style-column.

Malabar, South Canara and Concan.

* * *Calyx of female 6-5 cleft, ovary glabrous.*

9. GLOCHIDION FAGIFOLIUM, *Mull.*—A tree, male flowers pedicelled, female sessile, female calyx 6-fid, segments triangularly ovate, male oblongo-ovate, ovary globose 4-6 celled glabrous, style-column grey depressed thick a little broader and scarcely shorter than the ovary, radiately 4-6 cleft at the apex, glabrous in all its parts except the female calyx, branchlets angled, petioles 1½ lines long, stipules oblongo-ovate rigid, margins recurved, leaves about 4 inches long by 1-1½ inches broad, oblongo or lanceolato-ovate or ovato-lanceolate acuminate, acute at the base, ashy green above, brownish beneath, somewhat unequal sided, male pedicels at first 2 lines at length 4 lines long, female scarcely any, male calyx obovate 1 line long, female calyx puberulous 3-8 glomerate in the axils.—Phyllanthus fagifolius, *DC. Prod.* xv. 288.

Nilgiris, also in Tenasserim and Chittagong.

§ 2. *Style-column short or long-conical, i. e., narrowed above, more or less broader at the base, and there not much constricted.*

1. *Column about as long or twice as long as the ovary.*

* *Ovary 4 3-celled, hairy.*

10 GLOCHIDION ASPERUM, *Mull.*—A shrub or small tree, branches at length glabrous, ramuli hispidulous, leaves 3-3½ inches long by 1½ inches broad, elliptic ovate or obovate, minutely mucronulate pubescent and rough on both sides, costa and veins prominent, petioles 1 line long, stipules linear subulate 1 line long, pedicels of both sexes short, male densely pubescent 2½ lines long, female tomentose 1 line long, calyxes subtomentose, segments of the female oblongo-obovate subacute, ovary globose 4-celled slightly tomentose, style-column subcylindric pubescent about as broad and twice or nearly 3 times as long as the ovary.—Phyllanthus asperus, *DC. Prod.* xv. 297.

Malabar and Concan.

11. GLOCHIDION DIVERSIFOLIUM, *Mull.*—Male flowers fasciculate, female glomerate, calyxes small, segments elliptic, ovary globose 2-4-5 celled obscurely sericeous gradually attenuated into a conical silky styline column which is 1½ times longer than the ovary, with 3-4 erect lobes at its apex, capsule depressed deeply 3-4 sulcate very shortly pubescent.—Phyllanthus, *DC. Prod.* xv. 297.

Var. α. *longifolium*, ramuli glabrous or the younger ones pubescent and soon glabrous, leaves elongate, capsules hoary-pubescent.—G. ellipticum, *Wight Icones* 1606.

Malabar, Concan, &c.

Var. β. *Wightianum*, ramuli glabrous, leaves acute at the base very unequal sided, long cuspidato acuminate.

Southern India.

§ 3. *Style-column obovoid or ovoideo cylindric, somewhat constrcited at the base, thick, broader than the base of the ovary.*

§ *Female calyx 6-cleft, ovary 5-6 celled.*

12. GLOCHIDION NEILGHERRENSE, *Wight.*—For description, &c. see Pl. clxxvii.

13. GLOCHIDION ARBOREUM, *Wight.*—A small tree, branches pubescent, leaves about 2 inches long and 1 inch broad, oblongo-ovate acuminate unequal sided at the base glabrous, petioles about 1½-2½ lines long, male flowers on pedicels 3 lines long fascicled, female subsessile glomerate both mixed, male calyx 6-parted, female sub 6-cleft both pubescent, segments of the female broad triangularly-ovate sometimes connate in pairs pubescent externally. Connective much elongated, ovary 5-celled glabrous, style column thick subobvoid truncate about 3 times as long as the ovary, 5-toothed at the apex, capsule crowned until maturity with the persistent style-column.—Phyllanthus arboreus, *DC. Prod.* xv. 303. G. arboreum, *Wight Icones* 1907.

Tinnevelly and Travancore Ghat forests.

§ *Female calyx 6-parted.*

* *Ovary* (4) 3 *celled glabrous.*

14. GLOCHIDION CORIACEUM, *Thw.*—A small tree glabrous in all its parts, leaves 4-6 inches long by 1½-2½ inches broad, ovate or oblongo-ovate, slightly acute at the base, equal sided coriaceous smooth, primary veins prominent only 3-4 on each side, petioles 1½-2 lines long thick. Female calyx sessile a little more than 1 line long coriaceous glabrous, segments oblongo-elliptic obtuse, ovary depresso obovoid 3-celled glabrous, style column oblongato-obovoid 3-4 times as long as the ovary, constricted at its base, in fruit slender cylindric 4 times longer than broad, capsule 3-coccous depresso-globose about ½ inch in diameter 3-sulcate, male flowers not known.—Phyllanthus coriaceus, *DC. Prod.* xv. *p.* 304. Glochidion coriaceum, in part, *Thw. En. Pl. Zey. p.* 284, (*c. p.* 342 *only*).

Ceylon, central provinces 3000-4000 feet elevation. No. 7, brachylobum, and 15 pycnocarpum, are closely allied, and considered by Thwaites to belong to this species.

15. GLOCHIDION PYCNOCARPUM, *Mull.*—A small tree, glabrous in all its parts, branchlets slightly angular above, stipules broad triangular short persistent, leaves 1½ 3 inches long by about 1 inch broad, obliquely lanceolate cuspidato-acuminate or gradually acuminate, unequal at the base, slightly coriaceous scarcely shining, petioles about 2 lines long. Male and female flowers mixed in the axils, male on pedicels 4 lines long, female sessile, male calyx-segments lanceolato-elliptic, female broadly ovate acute all glabrous, ovary globose 3-celled glabrous, style-column cylindrico-ellipsoid about as broad as and twice as long as the ovary, obtusely 3-lobed, a little constricted at the base, in fruit cylindrico-obovoid twice as long as broad, capsule scarcely more than ¼ inch in diameter blackish. —Phyllanthus, *DC. Prod.* xv. 304. G. coriaceum, *Thw. l. c. in part.* (*c. p.* 2529).

Ceylon, central provinces, like the preceding, but the leaves small and less coriaceous and unequal at the base, and the female calyx and capsule much smaller, and the styline column much thicker in fruit.

16. GLOCHIDION JUSSIEUANUM, *Wight*—A small tree, quite glabrous in all its parts except the female calyx, ramuli slender, stipules obliquely triangulari-ovate acute about 1 line long, leaves 3-4 inches long by 1½ inch wide, ovato or elliptico-lanceolate cuspidato-acuminate, submembranaceous, petioles 1½-1¾ lines long. Female pedicels equal to male pedicels, about twice as long as the petioles, segments of the female calyx oblongo-elliptic subacute glabrous outside adpressedly puberulous within, ovary depresso-globose 3 (4)-celled glabrous, column of styles thick cylindrico-obovoid or ellipsoid constricted at the base, glabrous twice as long and a little broader than the ovary.—Gynoon Jussieuanum, *Wight Icones* 1908. Phyllanthus, *DC. Prod.* xv. 304.

Ceylon, up to 4000 feet elevation.

17. GLOCHIDION STELLATUM, *Retz.*—A small tree, glabrous in all its parts, ramuli angled greenish, stipules broadly triangulari-ovate acute short rather rigid, leaves 3 inches long by 1-1½ inches broad, oblongo-ovate or oblongo-elliptic, shortly acute at both ends, coriaceous, smooth rather shining pale above, somewhat fuscous beneath, petioles 1½ lines long. Male pedicels larger than female, shorter than the petioles. Segments of the female calyx oblongo-elliptic glabrous, ovary sub depresso-globose 3-celled glabrous, column of styles oblongo-obovoid broader than and 2-3 times longer than the ovary, shortly trifid at the apex. Capsule about 3 lines in diameter.—Phyllanthus stellatus, *Retz. Obs. Bot. Fasc.* 5 *p.* 29 ;—*DC. Prod.* xv. 305. Gynoon rigidum, *Adr. Juss. Tent. Euph. p.* 107 *t.* 3. *f.* 9. Glochidion rigidum, *Mull.*

Ceylon, Southern India, Sikkim, nearly allied to the last species.

§ 4. *Style-column broader above, narrowed at the base, but there scarcely narrower than the ovary, not constricted in a circle just at the base. Ovary 6-3-celled, puberulous.*

18. GLOCHIDION MALABARICUM, *Mull*—A small tree, ramuli puberulous. Stipules lanceolato-subulate rather rigid entire 1½ lines long, leaves 2½ to 3¼ inches long by 1-1½ inches broad, oblongo or lanceolato-elliptic, shortly or acutely cuspidato-acuminate, subacute at the base, the costa and primary veins beneath puberulous or at length glabrous, petioles 1¾ lines long, flowers numerous. Males with slender pedicels, female subsessile, glomerate, both sexes mixed, calyx-segments lanceolate male at length elongate, ovary 3-4 celled globose puberulous, style-column obconico cylindric not constricted at the base, about equal in breadth but twice as long as the ovary, acutely 6-8 lobed at the apex puberulous.—Phyllanthus Malabaricus, *DC. Prod.* xv. 305.

Malabar, Canara and Concan.

§ 5. *Style column broader above, narrowed at the base, and narrower than the ovary, not constricted in a circle just at the base.*

1. *Column of styles thick about once or twice as long as the ovary.*

* *Ovary* 8 5-*celled glabrous.*

19. GLOCHIDION PERROTTETIANUM, *Mull.*—A small tree, glabrous in all its parts except the female calyx, ramuli slightly angled, stipules small ovate, leaves lanceolato-elliptic slightly unequal sided glabrous olive-green above, reddish brown beneath, petioles 1¾ lines long broad and gradually running into the leaf, female flowers sessile subsolitary, female calyx large 5-6 toothed obconical rufo-puberulous. Ovary 5-6 celled globose glabrous, column of styles broadly obconical thick truncate asperulous slightly 5-6 cleft, in length slightly exceeding the ovary, in breadth equalling it at the base and not constricted, capsule 5-6-coccous much depressed, ½ an inch in diameter, 3 lines long. Male flowers unknown.

Nilgiris.

** *Ovary 4-3 celled, hairy.*

20. GLOCHIDION VELUTINUM, *Wight.*—A small tree, branches and branchlets rather tomentose, leaves oblongo-elliptic or oblongo-obovate, rather densely pubescent, shortly acuminate, often acute at the base, 2-2½ inches long Male pedicels 3 times as long as the petioles, pubescent, female equalling the petioles or a little longer, ovary 4-celled globose sericeo-tomentose, style-column cylindrico-obovoid truncated at the apex 4-cleft, about twice as long as the ovary, whitish tomentose, capsule subglobose small (4 lines in diameter.) *Wight Icones* 1907. Phyllanthus, *DC. Prod.* xv. *p.* 309.

Very common throughout our western forests up to 4000 feet, also in Sikkim and Khasya.

2. *Column oblongo-obovoid or oblongo-obconical, rather stout, 3-4 times as long as the ovary, ovary 5-3 celled, hairy.*

21. GLOCHIDION DALTONI, *Mull.*—A small tree, branchlets slightly angled fuscous glabrous, leaves 3-4 inches long by 1-1½ inches broad narrow lanceolate rather unequal sided often slightly falcate glabrous fuscous, rather shining above, petioles about 2 lines long. Male flowers fasciculate, female subsessile glomerate the pedicels of the former nearly 3 times as long as the petioles glabrous, ovary 4-celled depresso subglobose densely cinereo-sericeous contracted at the apex, style column narrow obconico-obovoid, narrowed at the base and there much narrower than the ovary, obtusely 4-lobed at the broader apex, 3-4 times longer than the ovary glabrous, capsule depresso-turbinate deeply 4-sulcate very shortly pilose, about 5 lines in diameter, slightly pilose (under the lens.)—Phyllanthus, *DC. Prod.* xv. 310.

Nilgiris, also in Northern India and Birmah.

22. GLOCHIDION HEYNEANUM, *Wight.*—A small tree, male pedicels glabrous, female pubescent, the segments of the male calyx ovate acute glabrous, female oblongo-obovate acuminate pubescent, ovary 5-celled adpressedly sericeous globose, style-column elongato-obconical 3 times as long as the ovary, but much narrower than it at the base, leaves lanceolate and shortly acuminate acute at the base, rather unequal sided, rusty pubescent beneath, 3½ to 4½ inches long by 1½ inches broad. Capsule 2-3 lines broad reddish.—Glochidion Heyneanum, *Wight Icones* 1908 (*dissections* only). Phyllanthus, *DC. Prod.* xv. 311.

Southern India.

23. GLOCHIDION SYMPLOCOIDES, *Mull.*—A small tree, 15-20 feet, ramuli obscurely subtomentose, stipules triangulari-lanceolate pilose nearly equalling the petioles, leaves oblongo ovate rather obtuse, rather rigid glabrous above, softly pubescent beneath, 1½-3 inches long by about ¾ to 1½ inches broad, petioles 1-1½ lines long. Male pedicels twice as long as the petioles rather villous, male calyx a little larger than the female, female pedicels obsolete, female calyx puberulous on the outside glabrous within, ovary 3-celled depresso-globose tomentose, style-column obovideo-cylindrical rather stout, slightly broader above and there densely hispidulous, 4 times longer than the ovary, capsules glabrous depressed 3-lobed.—Phyllanthus symplocoides, *DC. Prod.* xv. 311. Glochidion montanum, *Thw. En. Pl. Zey.* 286. (*c p.* 3133.)

Ceylon, central provinces, at Oova 4000-6000 feet elevation, closely allied to G. Moonii, but it differs in its more arboreous habit, its smaller less acuminate leaves and glabrous capsules.

3. *Column clavate slender 4-8 times as long as the ovary. Ovary 3 celled.*

* *Ovary glabrous.*

24. GLOCHIDION LEPTOGYNUM, *Mull.*—A small tree, ramuli subglabrous flexuose, stipules triangulari-ovate short pilose the margins fimbriato ciliate, leaves 2½ to 3 inches long by 1-1½ inches broad, ovato-or oblongato-elliptic acute at both ends, glabrous slightly coriaceous brownish, petioles 1-1¼ lines long. Male pedicels 2 3 times longer than the petioles very slightly hirsute, female pedicels obsolete, calyx in both sexes pilose outside glabrous within, the segments of the male oblongo elliptic subacute, of the female obovato-lanceolate acuminate, ovary 3-celled depresso-globose glabrous, style-column slenderly clavate glabrous about 8 times as long as the ovary, gradually narrowed at the base and there narrower than the small ovary, capsule glabrous depressed 3-lobed.—Phyllanthus leptogynus, *DC. Prod.* xv. *p.* 312. Glochidion Gardneri, *Thw. En. Pl. Zey. p.* 286. (*c p.* 3156.)

** *Ovary hairy.*

25. GLOCHIDION MEMORALE, *Thw.*—A tree, ramuli angled obscurely puberulous, stipules linear lanceolate puberulous, leaves 3½-7 inches long by 1½-2 inches board, ovato-lanceolate oblique at the base gradually narrowed at the apex into a long acumen, subcoriaceous adpressedly pubescent on the nerves, petioles about 2 lines long puberulous. Male pedicels 3-4 times longer than the petioles slightly pubescent, female pedicels a little longer than the petioles pubescent, calyx segments ovato-lanceolate acute pubescent on the outside glabrous within, ovary 3-celled pubescent. Style column clavate gradually narrowed into the ovary and about 8 times as long as it, puberulous below glabrous above. Capsule glabrous depressed 3 lobed —Phyllanthus memoralis, *DC. Prod.* xv. 312. Glochidion memorale, *Thw. l. c.* 286. (*c. p.* 3015.)

Ceylon, Pasdoon Corle, at no elevation.

26. GLOCHIDION GLAUCOGYNUM, *Mull.*—A small tree, leaves ovato-or oblongo lanceolate acuminate, 2-8 inches long by 1-3 inches broad, shortly villosulous as are the ramuli, petioles and calyxes. Male flowers fasciculate, female glomerate, segments of the male calyx elliptico lanceolate pubescent on the outside glabrous within, female segments spathulato-lanceolate pubescent on both sides, ovary 3 celled globose obscurely fulvo-villosulous. Style-column cylindrico-clavate about 6 times longer than the ovary and at the

base a little narrower than it, slightly clavate and thickened at the apex 4-lobed, above pruinoso-glaucescent, below fulvo-villosulous, capsule nearly ½ inch broad.—Phyllanthus glaucogynus, *DC. Prod.* xv. 312. Glochidion Moonii, *Thw. in part.* (*c. p.* 2150.)

Ceylon ; differs from Moonii in the pubescence being much shorter or shortly villosulous instead of hirsuto-pubescent, and in the leaves being glaucescent beneath, and in the segments of the female calyx and the styline column being shorter.

27. Glochidion Moonii, *Thw.*—A small tree, leaves 3-8 inches long by 1-3 inches broad; oblongo-elliptic or sometimes ovato or elliptico-lanceolate shortly but acutely cuspidato-acuminate, acute at the base, somewhat unequal sided, hirsuto-pubescent on both sides, petioles about 2 lines long. Male pedicels 2-3 times longer than the petioles, obscurely fulvo-villous, as are the calyxes and styline column. Male calyx segments elliptico-lanceolate hirsute outside glabrous within. Female segments lineari-spathulate acute hirsute on both sides, ovary 3-celled subglobose hispiduloûs. Style-column very long slenderly clavate many times longer than the ovary, much narrower than the ovary at its base, above rather broader slightly sublanato-villous except at the apex. *Thw. En. Pl. Zey. p.* 286 (*c. p.* 258.) Gynoon hirsutum, *Wight Icones* 1909. Phyllanthus Moonii, *DC. Prod.* xv. 286.

Ceylon, very common in central provinces.

I have followed DeCandolle's arrangement of the species, but I am pretty certain that the number will have to be considerably reduced.

MELANTHESOPSIS. Mull

Gen. Char. Monœcious. Male-calyx gamosepalous turbinate 6-lobed in 2-series, lobes imbricate, transversely plicato-subappendiculate at the back, female-calyx turbinate, 6-cleft, about a quarter or a half down rotately spreading above, more or less enlarging with the fruit, petals wanting in both sexes, disk none. Stamens 3, central monadelphous, anther-cells adnate lengthways extrorse, connective produced more or less above the cells, rudiment of ovary none, ovary 3 celled, cells 2-ovuled. Styles 2-parted, fruit at first baccate at length capsular 3-valved, seed with an aril and a distinct hilum albuminous, embryo slightly curved, cotyledons broad equalling the radicle. Trees or shrubs, flower branches solitary or fascicled, leaves distichous, short petioled penniveined entire bistipulate, flowers axillary, male inferior subracemose or fascicled, female occupying the superior axils, generally solitary or sometimes subracemose. *DC. Prod* xv, 436. Melanthesa, *Bl. Bijdr.* Phyllanthus Sp., *Auct.*

1. Melanthesopsis patens, *Roxb.*—A small tree or large shrub, leaves membranaceous, entire oval to oblong or ovate obtuse often unequal sided, ½-1 inch long, flowers axillary, the female solitary, the male fascicled in the lower axils, or sometimes male and female mixed, fruit size of a pea, the enlarged calyx colored —Phyllanthus patens, *Roxb. Fl. Ind.* iii. 667. Melanthesopsis, *DC. Prod.* xv. 437.

Var. α. oblongifolia —A large shrub, leaves oblongo-ovate or elliptic obtuse at both ends or subacute, beneath pale glaucous, about ¾ inch long. Malabar, &c Melanthesa obliqua, *Wight Icones* 1898.

Var. β. turbinata.—A pretty large tree, leaves ovate about 1-inch long. Phyllanthus turbinatus, *Roxb. l. c.* 666.

Mountains on the east side of the presidency.

Var. γ. vulgaris.—A shrub, leaves broadly elliptic slightly glaucescent beneath, ½ to ¾ inch long. Melanthesa turbinata, *Wight Icones.* 1897.

Common throughout India and Ceylon.

The Analysis, Pl. XXIV., fig. 2, under the name of this genus, belongs to the next genus Breynia.

BREYNIA. Forst.

Gen. Char. Male-calyx gamosepalous turbinate 6-lobed in two rows as in Melanthesopsis, petals none, disk none, stamens central, anthers adnate lengthways to a broad club-shaped filament, which is prolonged and flattened at the apex, rudiment of ovary none, (unless the broad club be so considered), ovary globular, styles none, stigmas 3, fruit baccate mealy tricoccous, the fruiting calyx not enlarged or sometimes enlarging. Seed exarillate ecarunculate albuminous, radicle shorter than the broad cotyledons. Small trees or shrubs, only differing generically from Melanthesopsis in the seed being exarillate and the radicle being shorter than the cotyledons. *Forst. Gen. t.* 73 ;—*DC. Prod* xv. *p.* 438.

* *Fruiting calyx not enlarged.*

1. Breynia rhamnoides, *Willd.*—A small tree, branchlets bifarious flexuose, leaves alternate oval entire smooth, about an inch long by ¾ inch broad, male flowers fascicled in the axils several together, female solitary, female calyx not increasing in size with the fruit, ovary with a depressed apex, styles none, berry globose bright red. Phyllanthus rhamnoides, *Willd. sp.* 4 *p.* 580. Breynia, *DC. Prod.* xv. *p.* 410. Melanthesa, *Bl. Bijdr.* 591. Phyllanthus rhamnoides, *Wight Icones* 1898 not *Roxb.* Phyllanthus vitis idœa, *Roxb. Fl. Ind.* iii. 665.

Common throughout India and Ceylon, also in Java and the Philippines ; the wood is white, hard, and durable, and in use with the natives.

Analysis, Pl. XX, fig. 2.

(Incorrectly under the name Melanthesopsis patens.)

1. Portion of a branch in flower.
2. A male flower.
3. The same open, only shewing 4 lobes of the 6-lobed calyx, anthers 3 adnate lengthways to the square topped broad club-shaped filament.
4. A female flower.
5. Female calyx opened out.
6. Ovary cut vertically.
7. Ovary cut transversely, 3 cells each 2-ovuled.
8. Fruit.
9. Fruit cut vertically

PUTRANJIVA. WALL.

For Gen Char. see letter-press to Pl. cclxxv.

Sec. EUPUTRANJIVA.—*Male calyx 3 5 parted, female 5-6 parted. Stamens 3, filaments monadelphous, or 2 connate and the third free. Ovary 3-celled, stigma triangularly dilated.*

1 PUTRANJIVA ROXBURGHII, *Wall.*—For description, &c. see Pl cclxxv.

Sec. PALENGA.—*Male calyx 2-parted, female 4-parted. Stamens 2, filaments free, ovary 2-celled, stigmas reniform.*

2. PUTRANJIVA ZEYLANICA, *Thw.*—A tree 40-50 feet high, glabrous, branches terete, leaves lanceolate acuminate penniveined, oblique shining, blackish green, beneath slightly glanduloso-punctate, 3-5 inches long by 1-1¾ inch broad, petiole rugulose 2 lines long. Stipules minute, flowers white ¾ line long, pedicels 1 line long, fruit 8 lines long 4 lines broad fusco-tomentose.—Palenga Zeylanica, *Thw. Hook Journ. of Bot.* viii. 270 *et En. Pl. Zey. p.* 287. Putranjiva, *DC. Prod.* xv. *p.* 444.

Ceylon, Ambagamwa district, at about 2000 feet elevation, called Palenga.

Analysis, see Pl. cclxxv.

1. A male flower shewing the 2-parted male calyx broken off and the 2 free stamens.
2. Female flower 4-lobed, calyx, ovary and reniform stigmas.
3. Fruit cut vertically, shewing the embryo lying in albumen.

SECURINEGA. JUSS.

Gen. Char. Calyx of male and female 5-parted quincuncial, segments persistent, petals none, disk of the male extra staminal, glands alternating with the calycine segments and stamens. Stamens 5 opposite the calyx-segments inserted round the rudiment of an ovary, filaments free, anthers oblongo-ellipsoid, cells cohering lengthways extrorsely or introrsely 2-cleft, rudiment of ovary 2-3 partite. Disk of female 5-lobed, ovary 3-2-celled, cells 2-ovuled, styles 3 shortly connate at the base, bifid at the apex, lobes subreflexed, fruit at first more or less fleshy at length capsular 3-coccous or by abortion 2-1-coccous, cocci 2-valved normally 2-celled, seed obtusely triangular smooth, embryo nearly straight, radicle nearly equalling the cotyledons, cotyledons fleshy slightly curved narrow ovate elliptic or obovate Trees or shrubs with a very hard wood (hence the name securis, an axe, nego, to refuse), branches compressed tetragonal or terete, sometimes spinescent at the apex, leaves minutely bistipulate penniveined, flowers diœcious or monœcious always axillary, male fascicled more numerous, female solitary or less numerous. *Juss. Gen Pl. p.* 388. Fluggea, *Willd.* Besera, *Spreng.* Geblera, *Fisch. et Mey.* Colmeiroa, *Reut.* Meineckia, *Baill.* Villanova, *Pourr.* Sched. ex cutanda. Xylophylla, *Willd.* ;—*DC. Prod.* xv. 446.

Sec. FLUGGEA.—*Anthers at least when young distinctly extrorse.*

§ *Glands of the male flower free, flowers diœcious.*

1. SECURINEGA OBOVATA, *Willd.*—A small or middling sized tree, branches ascending, floriferous branchlets quadrangular not spinescent at the apex, leaves oblongo-ovate or oval entire smooth, 1-2 inches long by ½-1 inch broad, flowers diœcious very small as in the generic character, axillary, fruit size of a pea white fleshy.—Xylophylla obovata, *Willd. Enum. Pl. Hort. Berol. p.* 329. Securinega, *DC. Prod.* xv. 449. Phyllanthus virosus, *Roxb. Fl. Ind.* iii. 659. Fluggea virosa, *Baillon.*

Common throughout India, also in China, the Philippines, Australia, Java, Mauritius, Madagascar and Africa ; the bark is a strong astringent and used to intoxicate fish ; the plant is generally only a shrub in the plains, but a tree up in the mountains.

2. SECURINEGA LEUCOPYRUS, *Koen in Roxb.*—A shrub, branches rigid spreading in every direction round the trunk, floriferous branchlets terete, spinescent at the apex, the spinous part leaf and flower-bearing, leaves short petioled obcordate smooth entire, stipules minute oval obtuse, flowers diœcious axillary, as in the genus, fruit size of a grain of pepper di-tricoccous.—Phyllanthus leucopyrus, *Koen. MS. in Roxb. Fl. Ind.* iii. 658. Securinega, *DC. Prod.* xv. 451. Fluggea, *Willd* ;—*Wight Icones* 1875.

Common throughout the Madras presidency, Bombay and in Ceylon.

Analysis, Pl. XXIV., fig. 4.

1. Portion of a branch of the male tree in flower.
2. A small flower bud.
3. A male flower.
4. The male flower open, 5 free stamens opposite the calyx segments surrounding the 3-cleft rudiment of ovary, 5 glands alternate with stamens.
5, 6. Anthers, front and back view.

7 to 12 were by mistake drawn from the female of Flacourtia sepiaria, and do not belong even to this order.

MISCHODON. Thw.

For Gen. Char. see letter-press to Pl. ccxc.

1. Mischodon Zeylanicus, *Thw.*—For description, &c. see Pl. ccxc.

BACCAUREA. Lour.

For Gen. Char. see letter-press to Pl. cclxxx.

1. Baccaurea sapida, *Roxb.*—For description, &c. see Pl. cclxxx.

I have lately found (Tambacherry ghat, Wynaad) trees with yellowish white (instead of red) flowers; these would probably have fruit of the same color.

BISCHOFFIA. Bl.

For Gen. Char. see letter-press to Pl. cclix.

1. Bischoffia Javanica, *Bl.*—For description, &c. see Pl. cclix.

HEMICYCLIA. Wight & Arnt.

For Gen. Char. see letter-press to Pl. cclxxix.

1. Hemicyclia elata, *Bedd.*—For description, &c. see Pl. cclxxix.

2. Hemicyclia sepiaria, *WA.*—A small tree or large ramous shrub, leaves alternate elliptic or ovate obtuse coriaceous glabrous entire or repand-denticulate, 1½-2 inches long by ¾-1¼ broad, flowers axillary usually aggregated longish pedicelled, male flowers 7-11 androus, no rudiment of an ovary, sepals 4 suborbicular concave pubescent outside, female subsessile, peduncles afterwards elongating, ovary on a fleshy disk 2-celled crowned with 2-sessile semicircular stigmas, calyx divisions suborbicular concave pubescent on the outside, ripe fruit globose. *Wight and Arnott. in Ed. New Phils. Journ. v.* 14. 297 ;—*Wight Icones* 1872.

Mountains on the east side of the presidency. Malabar, very abundant on the mountains in the Salem district up to 3000 feet elevation. Ceylon ; the wood is very hard and close grained and something like box ; the tree is called in Ceylon Weera.

3. Hemicyclia lanceolata, *Thw.*—A middling sized tree, ramuli petioles and inflorescence pilose, leaves subglabrous lanceolate obtusely acuminate mucronate, oblique at the base subacute, submembranaceous beneath pilose at the costa, 1-3 inches long by ½-1 inch broad, petiole 1-2 lines long, flowers small few about 2 lines in expansion. *Male*, stamens about 10-16 ; *female*, style short dilated bifid reflexed, drupe oblong oblique at the apex red, 6 lines long, 3 lines wide. *Thw. En. Pl. Zey. p.* 286.

Ceylon, Cultura ; the wood is hard and close grained.

4. Hemicyclia Gardneri, *Thw.*—A middling sized tree, young parts, petioles and inflorescence pubescent, leaves lanceolate crenate retuse mucronate oblique at the base, the costa beneath adpressedly strigose and the veins often more or less hairy, 1-3 inches long by ½-1 inch broad, petiole 1-2 lines long, flowers few pale-yellowish 6 lines in expansion. *Male*, stamens about 24 round the disk, which is hollowed out in the centre, rudiment of ovary none. *Female*, style short, stigma convex fleshy, drupe oblong 4 lines long.

Ceylon, in the hot drier parts of the island.

5. Hemicyclia venusta, *Wight.*—A small elegant drooping tree, gemmæ pubescent, leaves elliptico-lanceolate gradually attenuated into a fine acumen, coriaceous entire pale colored quite glabrous above, beneath with a few inconspicuous hairs (only visible under the lens) coriaceous, 3-4 inches (or rarely more) long by 1-1½ broad, venation prominent, petioles 3-4-lines long, inflorescence tomentose in axillary fascicles, the pedicels a little shorter than the petioles, the male with more numerous flowers than the female, stamens 5-9.—Astylis venusta, *Wight Icones tab.* 1992 (the leaves represented longer than I have ever seen them.)

Western ghats from S. Canara down to Tinnevelly, common in the moist forests 2000-4000 feet elevation ; the wood is very hard.

CYCLOSTEMON. Bl.

For Gen. Char. see letter-press to Pl. cclxxviii.

Sec. Stenogynium.—*Stamens few, ovary 2-celled, stigmas sublinear entire, the thick apex peltately or semipeltately dilated.*

1. Cyclostemon Indicus, *Müll.*—A considerable tree, branches and branchlets slender glabrous, leaves 3-5 inches long by 1-2 inches broad, ovate or elliptico-lanceolate, long cuspidate acuminate, entire submembranaceous reticulato-venose glabrous, petioles 2-3 lines long, flower-pedicels slender as long as the petioles, male pedicels and calyx, except the ciliate margin glabrous, those of the female sericeo-pubescent, anthers 6-4, disk central thick undulated subcompressed, ovary sericeous, styles slender, apex peltately dilated. *DC. Prod* xv. 481.

Malabar and Canara, also in Northern India, Sikkim, Khasya, &c. I have never met with this tree.

Sec. Eucyclostemon.—*Stamens numerous, ovary 2-celled, stigmas broad 2-lobed.*

2. Cyclostemon macrophyllus, *Bl.*—For description, &c. see Pl. cclxxviii.

3. Cyclostemon Malabaricus, *Bedd.*—A large tree, young branches densely aureo-tomentose, leaves entire membranaceous oblong rather suddenly acuminated at the apex, unequal sided at the base (one side attenuated the other rounded) tomentose on both sides, when young at length glabrous above except the costa, pilose beneath on the costa and veins, 8-9 inches long by 2½ broad, primary veins prominent beneath 7-10 on each side of the costa, petioles about 3 lines long, male flowers densely fascicled on the older branches, pedicels about 3 lines long aureo-tomentose, calyx-segments 4 broad cucullate imbricate densely aureo-tomentose on the outside, glabrous within, stamens very numerous in 2-3 rows round a tomentose cup-like disk, anthers introrse, rudiment of ovary none, female flowers not seen, fruit solitary along the the older branches on pedicels ½ inch long, about 1 inch long by ¾ inch broad densely tomentose crowned by 2 reniform stigmas.

Tinnevelly ghat forests, 3-4000 feet elevation.

APOROSA. Bl.

For Gen. Char. see letter-press to Pl. cclxxxvi.

1. Aporosa Lindleyana, *Wight.*—For description, &c. see Pl. cclxxxvi.

2. Aporosa fusiformis, *Thw.*—A middling sized tree, leaves subentire coriaceous glabrous obovate or rotundate short and obtusely acuminate or retuse, acute or rounded at the base, 2½-5 inches long by 1¼-3 inches broad, primary veins about 5 on each side, petioles ½-¾ inch long, catkins ferruginous tomentose, bracts rotundate ciliate, male flowers generally diandrous, female flowers crowded, ovary glabrous, stigmas 2-3-parted, lobes revolute bifid at the apex, fruit fusiform 6-8 lines long 3-4 lines broad, pericarp moderately fleshy. *Thw. En. Pl. Zey. p.* 288.

Ceylon, central provinces, 4000-6000 feet elevation.

3. Aporosa latifolia, *Moon.*—A middling sized tree, leaves subentire glabrous subcoriaceous obovate obtuse more or less rotundate or subcordate at the base, 4-8 inches long by 3-5 inches broad, primary veins about 7 on each side, petiole ½-1 inch long. Catkins ferrugineo-tomentosé, bracts rounded ciliate, male flowers generally diandrous, female flowers sessile, ovary pilose, stigma 3-parted, lobes reflexed, bifid at the apex, fruit subsphærical a little conical about an inch long, pericarp very fleshy.—Agyneia latifolia, *Moon. Cat. p.* 65. Aporosa, *Thw. En. Pl. Zey. p.* 288.

Ceylon, south of the island at no elevation.

4. Aporosa acuminata, *Thw.*—A small tree, sparingly ramous, young parts pilose, leaves glabrous entire membranaceous ovato or oblongo-lanceolate acuminate acute at the base, 1½-4 inches long by ½-2 inches broad, petioles 2-4 lines long. Catkins ochraceo-pilose short generally solitary, female generally 1-flowered, ovary ovoid pilose 3-celled, stigma large 3-parted, lobes bifid at the apex, fruit subsphærical sessile, about ¾ inch in diameter, greenish-red generally 3-seeded, pericarp very fleshy, seed yellowish red the outer coat fleshy. *Thw. En. Pl. Zey. p.* 288.

Ceylon, Ambagamwa district and near Balangodde, 2000-3000 feet.

5. Aporosa lanceolata, *Tul.*—A small tree, branches terete elliptico or obovato-lanceolate here and there subrepando-denticulate, cuspidately acuminate at the apex, 4-5 inches long by 1-1½ inches broad subcoriaceous, petioles 4-5 lines long. Male catkins pubescent, flowers generally diandrous, rudiment of ovary minute inconspicuous, female spikes about 5-flowered, ovary ampulloeform, glabrous. Stigma short sessile disciform 2-lobed, lobes bifid often denticulate, fruit subsphærical the size of a pea. Seed with the outer coat fleshy yellow.—Lepidostachys lanceolata, *Tul. in Ann. des Sci. Nat. (Bot.) Ser.* 3 v. 15 *p.* 254. Aporosa, *Thw. En. p.* 288 ;—*DC. Prod.* xv. 475.

Ceylon, common up to 2000 feet elevation.

Aporosa sphœrocarpa, *DC*, is only, I believe, a form of A. Lindleyana.

ANTIDESMA. Burm.

Gen. Char. Flowers diœcious, the males in catkins, the females in racemes or spikes, perianth small and calyx-like of 3 to 5 (rarely 6-8) segments or lobes. *Male:* stamens 2-5 (rarely more), filaments free. *Female:* ovary 1-celled with 2 pendulous ovules, styles 3-4 very short and divergent united at the base, fruit a drupe usually somewhat flattened and oblique. Trees or shrubs, leaves alternate entire.—Stilago, *Schreb.*

§ *Flowers* (5)-8 *merous, stigmas terminal.*

1. Antidesma Ghæsembilla, *Gærtn.*—A small tree, the young branches leaves and inflorescence softly pubescent and tomentose, stipules subulate, leaves obovate broadly elliptical or nearly orbicular, often slightly cordate at the base very obtuse or suddenly acute, 1½-3½ inches long by 1-3 broad, primary veins prominent, petioles 2-6 lines long, rarely longer, spikes paniculate dense-flowered, the male longer and more slender, bracts small oblongo-obovate acute ciliate, male calyx sessile deeply 5-rarely 7-parted, disk pilose, stamens 5 rarely 7, ovary ovoid very villous; stigmas short, fruit obovoid slightly compressed. *Gærtn. Fruct.* i. 189. *t.* 39;—*DC. Prod.* xv. 251.

Var. α. paniculatum.—Spikes very densely flowered, very densely lunato-tomentose, pedicels 3-4 times shorter than the fruit. A. paniculatum, *Roxb. Fl. Ind.* iii. 770;—*Wight Icones* 820.

Var. β. pubescens.—Spikes less densely flowered and less compound and more slender, the whole plant less densely tomentose. A. pubescens, *Roxb. Fl. Ind.* iii. 770;—*Wight Icones tab.* 821.

Both varieties are found on the mountains on both sides of the Madras presidency, and *var.* β. in Ceylon; they both extend to N. India, Birmah, Java, &c.; they are both met with in gardens in this presidency; the tree is called Boo-ambilla in Ceylon.

§ *Flowers* 4-3 *merous, triandrous; stigmas lateral.*

2. Antidesma Zeylanicum, *Lam.*—A shrub or small tree, branches slender glabrous, the young ones purplish and sometimes minutely pilose, petioles about one line long, leaves 1-3 inches long by ½-1¼ inch broad, oblongo-rhombeo-ovate or rhombeo-lanceolate acute at both ends, glabrous, prominently reticulated, spikes slender, male elongate flexuose ferrugineo-pubescent as long as or exceeding the leaves, bracts broadly ovate very short, calyx 3-4 parted to beyond the middle triandrous, rudiment of ovary at length obsolete, disk thick glabrous, ovary subglabrous, putamen small lunato-incurved. *Lam. Encycl.* i. *p.* 207.

Ceylon, common in the hotter parts of the island, called Heen-ambilla.

§ *Flowers* 4-3-*merous; stamens* 4-3; *stigmas terminal.*

Flowers spiked.

3. Antidesma Bunius, *Spreng.*—A tree, young parts slightly pubescent generally soon glabrous, leaves lanceolate to oblong obtuse acute or acuminate, glabrous and shining more or less coriaceous, 4-6 inches long by 1½-2 inches broad, petioles 2-4 lines long, stipules ovate cordate shorter than the petioles caducous, spikes axillary and terminal, the male 1-5 together, 4-6 inches long, slender interrupted, the female solitary and shorter; flowers sessile, stamens usually 3 rarely 4, fruit about 3-4 lines long smooth succulent bright red, putamen compressed rugose. *Spr. Syst. Veg.* i. 826;—*Wight Icones tab.* 819. Stilago Bunius, *Roxb. Fl. Ind.* iii. 758. A. comptum, *Tul. in Ann. des Sc. Nat.* 1851 *p.* 190;—*DC. Prod.* xv. 262. [Only a variety (found on the Tinnevelly mountains) with smaller more rigid leaves.] A. Thwaitesianum, *DC. Prod.* xv. 263.

Very common on all our Western Ghats, Mysore, and in Ceylon up to about 4000 feet elevation.

Analysis, Pl. XXIV, fig. 3.

1. Portion of a male spike or catkin.
2, 3. Triandrous male flowers, they are sometimes tetrandrous.
4, 5. Stamens, front and back view.
6. Portion of a female spike.
7. A female flower.
8. A bract.
9. Ovary cut vertically.
10. Ovary cut transversely.
11. Nearly ripe fruit.

Antidesma Roxburghii, *Tul.* (Stilago tomentosa, *Roxb.*), belongs to this section, but I have not found it wild in this Presidency; it occurs in gardens and is indigenous in Northern India.

* *Flowers racemose.*

4. Antidesma pyrifolium, *Müll.*—A middling sized ramous tree, ramuli petioles and inflorescence cinereo-tomentose, leaves entire subglabrous ovate or oblong obtusely rostrato-acuminate channelled above at the costa, acute at the base, 2-4 inches long by ¾-2 inches broad, petioles 2-5 lines long, racemose panicled or simple axillary and terminal, bracts short broad acute, pedicels about equalling the calyx, flowers normally 4-merous (rarely 5-6-merous), disk subglabrous, abortive ovary mamillæform, calyx cupuliform,

lobes short rounded or a little acute, fruit subsphærical a little compressed, size of a pea, purple. *DC. Prod.* xv. 265. A. montanum, *Thw. En. Pl. Zey* p. 289—not *Blume.*

Ceylon, central provinces, 3000-6000 feet.

The long petiole at once distinguishes this species; all the flowers I have examined were 4-androus.

§ *Calyx* 4-3-*merous* 3-2-*androus*; *stigmas terminal*; *flowers racemose.*

* *Bracts lanceolate.*

5. ANTIDESMA LANCEOLATUM, *Tul.*—A small tree, young ramuli glabrous or ferruginous, stipules linear subulate rather rigid longer than the petioles, leaves 3-5 inches long, 1-1½ inches broad, lanceolate with a longish acumen glabrous submembranaceous, petioles 2 lines long, racemes slightly pubescent simple or paniculato ramous, 2-3½ inches long, bracts ovato-or lineari-lanceolate subulato-acuminate, calyx urceolate 3-4 crenate glabrous outside and within 3-2-androus, rudiment of ovary linear glabrous or subobsolete, disk thick globose glabrous concave at the apex, ovary oblongo-ovoid glabrous above. *Tul in Ann. des Sc. Nat.* 1851, *p.* 195;—*DC. Prod.* xv. 266.

Nilgiris, Tinnevelly ghats, Ceylon, also in N. India and Java; *it differs from diandrum in the shape and size of the leaves, in its larger stipules, shape of bracts, larger racemes, and glabrous disk.*

* * *Bracts ovate.*

6. ANTIDESMA DIANDRUM, *Roxb*—A tree, ramuli soon glabrous, stipules about twice as long as the petioles erect pubescent deciduous, petioles rather ferrugineo-villous, about 1 line long, (short with reference to the other species), leaves 1¾-2½ inches long by 1-1½ inches broad or even larger, broad or narrow-elliptic, ovate or obovate more or less acute at the apex and base, glabrous above, pilose on the nerves beneath, racemes equalling or a little shorter than the leaves, lax slender simple or often sparingly branched subglabrous, bracts subglabrous, male pedicels slender nearly 1 line long, calyx glabrous on the outside fulvo-pilose within, urceolar shortly 4-toothed, diandrous, rudiment of ovary generally obsolete, disk adpresso-pilose, ovary ovoid glabrous at the apex. Stilago diandra, *Roxb. Fl. Ind.* iii. 759;—Ant. diandra, *Tul. l. c.* 198;—*DC. Prod.* xv. 266.

Found both on the eastern and western sides of the Madras Presidency and in Bengal.

7. ANTIDESMA ACUMINATA, *Wight Icones* 1991, is a doubtful member of this genus, as its fertile flowers are hermathrodite and the fruit is unknown. DeCandolle excludes it from the order, but judging from the figure, it seems to belong to this genus. It is said to be from Malabar, but I have not met with it. The following is Wight's description:—

"Shrubby or arboreous, leaves ovate oblong acuminate glabrous, stipules linear acute sometimes subfalcate unequal-sided, racemes axillary or terminal sometimes branched, bracts ovate acute, flowers short-pedicelled crowded male and hermathrodite, males 3-4 androus with a free capitate rudimentary style, calyx deeply 3-parted setaceo-dentate on the margin, stamens longer than the calyx, hermathrodite, calyx 3-4-parted, stamens 3-4 about the length of calyx, anthers 2-celled with a broad connective, ovary exceeding the calyx 1-celled, ovules 2 collateral pendulous from the apex, stigmas 3-4-lobed.

TRIBE BRIEDELIEÆ.

BRIEDELIA. WILLD.

For Gen. Char. see letter-press to Pl. cclx.

* *Primary veins* 15-28 *on each side of the leaf.*

1. BRIEDELIA RETUSA.—For description, &c. see Pl. cclx.

* *Primary veins* 9-15 *on each side.*

2. BRIEDELIA MOONII, *Thw.*—A tree, ramuli slightly hirsute, leaves nearly sessile, 4 to 6 inches long by 4-4½ inches wide, oblongo-elliptic or oblongo-obovate subobtuse at both ends, glabrous above, beneath minutely pubescent and prominently reticulato-venose, primary veins about 12 on each side, flowers axillary glomerate, female sessile, berry ovoid 3-4 lines long smooth. *Thw. En. Pl. Zey.* 279;—*DC. Prod.* xv. 497. Cluytia retusa, *Moon Cat.* Briedelia retusa, *Baillon.*

Ceylon, common up to 2000 feet elevation, called Pakaala; perhaps only a form of the common retusa, Pl. cclx., which is also common in Ceylon and called Kat-takaala, and from which it differs in its larger leaves, fewer primary veins, and ovoid fruit, and in the leaves not being at all glaucous beneath.

* * *Primary veins* 6-10 *on each side.*

I. *Calyx increasing with the fruit.*

3. BRIEDELIA STIPULARIS, *Linn.*—A scandent or sub-scandent large shrub, ramuli fulvo-tomentose or-pubescent slender, stipules lanceolate as long as the petioles, petioles about 2 lines long, leaves 2½-3 inches long by 1-1½ inch broad elliptic or obovate or

oblongo-obovate, entire obtuse at the apex, and shortly acute rarely acuminate, obtuse or slightly cordate at the base, above puberulous or subglabrous, beneath densely rufescento-pubescent, the primary veins 6-9 on each side, flower-heads generally furnished at the base with stipule-like bracts, male flowers sessile, female shortly pedicellate fulvo-sericeous, calycine segments greenish yellow ovato-triangular with a long acumen, at length increasing with the fruit, petals subsimilar in both sexes rather rigid obovate crenulate or entire, berry juicy blackish about 4 lines long oblong ellipsoid. Cluytia stipularis, *Linn. Mant. p.* 127. Briedelia, *Bl. Bijdr. p.* 597. *B.* scandens, *Roxb. Fl. Ind.* iii. 736.

A common plant on both sides of the presidency, also in Bengal, Java, the Philippines and Africa.

II. • *Calyx not enlarging in fruit.*

4. Briedelia montana, *Willd.*—A good sized tree, ramuli glabrous, stipules small acute withering, petioles about 1½ lines long, leaves obovate or oblongo-obovate entire glabrous, 2-3 inches long by about 1 inch broad, primary veins about 8-10 on each side, flowers greenish male and female mixed in axillary dense sessile heads, bracts minute withering, calyx 1 line long, segments triangulari-ovate, petals subsimilar in both sexes suborbiculari-ovate, crenulate shortly unguiculate, inner disk of the female embracing about ⅓rd of the ovary, berry globular greenish succulent as large as a pea. *Willd. Sp. Pl.* iv. *p.* 978 ;—*Roxb. Fl. Ind.* iii. 735.

On the mountains on the east side of the Madras Presidency, Vizagapatam district, Orissa, &c., also in Bengal ; the wood is very similar to that of B. retusa, hard, red and very durable ; the tree is called Patenga in Telugu.

5. Briedelia Hamiltoniana, *Wall.*—A small tree, ramuli slender glabrous, stipules 1½ lines long lanceolato-linear deflexed spreading, petioles 2-3½ lines long, leaves membranaceous glabrous 2-3½ inches long by 1-1½ inches broad, oblongo-rhomboideo-obovate entire or subrepando-dentate, rather pale on both sides, primary veins about 6-9 on each side, flower heads subtended by leaves or only bracts at their base (as in retusa), female flowers sessile, petals in the female ovate, in the male orbiculari-rhomboid all shortly unguicular, berry globoso-ellipsoid 3 lines long. *Wall. Cat.* 7882 ;—*DC. Prod.* xv. 500.

On the Concan ghats (Bombay), and probably Canara ; I have not met with this tree.

CLEISTANTHUS. Hook.

Gen. Char. Flowers monœcious or diœcious. Calyx-segments valvate 5-parted at length deciduous, petals as many alternate with the segments of the calyx subsimilar in both sexes or rather different in form and a little larger in the female, disk urceolate adnate to the calyx-tube, margin free subentire crenulate or 5-lobed, the lobes alternate with the petals. Stamens 5 verticellate round the centre of a central column or slightly 3-cleft abortive ovary, ascending, anthers 2-celled introrse, ovary nearly hid in the disk 3-celled, cells 2 ovuled, styles 3 bifid shortly or to the middle, lobes stigmatose, capsule 3-coccous, shells 2-valved, seeds often connate in pairs ecarunculate without any aril, sparingly albuminous, testa thin crustaceous, cotyledons membranaceous thin, variously folded. *Hook. f. in Hook. Icon. Pl. t.* 779. (1848). Lebidiera, *Baill. etud. Gen. Euph.* Leiopyxis, *Miq. Fl. Ind. Bat. Supp. p.* 445.

* *Stipules small.*

1. Cleistanthus patulus, *Roxb.*—A small or middling sized tree, ramuli slender glabrous, stipules small, leaves submembranaceous ovate or oblongo-ovate cuspidately acuminate entire glabrous shining, 3-4 inches long by 1-1½ inches broad, petioles about 3 lines long, flowers nearly sessile, male and female mixed in the axillary heads, or (by the abortion of the leaves) on axillary (naked) spike-like branchlets, bracts ciliate, calyx segments oblongo-ovate, petals very small obovate unguiculate similar in both sexes, styles shortly bifid, ovary hairy, capsule about 4 lines in diameter, subglabrous or sparingly pilose 3-lobed. Cluytia patula, *Roxb. Fl. Ind.* iii. 733. Amanoa Indica, *Wight Icones* 1911.

This elegant little tree is not uncommon in dry subalpine jungles on both sides of the presidency ; the wood is exceedingly hard and durable and of a rose color.

Analysis, Pl. XXIII, fig. 4.

1. Inflorescence, portion of one of the naked spike-like branchlets.
2. Male flower bud, sepals valvate.
3, 4. Male flowers.
5. Calyx opened, shewing the disk, and 5 small petals.
6. The abortive style-like ovary with the 5 stamens verticelled round it above the middle of the column, apex slightly trifid.
7, 8. Anthers, front and back view.
9. Apex of the abortive style (trifid.)
10. One of the obovate unguiculate petals.
11. A bract.
21. Capsule slightly pilose. (Nos. 12 to 20, see under C. pallidus).

2. Cleistanthus robustus, *Thw.*—A small tree glabrous, ramuli angled glabrous, leaves ovato-lanceolate or subrotundate, sometimes very oblique at the base cuspidately acuminate, fuscous glabrous coriaceous, 2-7 inches long by 2-2½ inches broad, petioles about 4 lines long, stipules small, spike-like branchlets scarcely exceeding the leaves, flowers in interrupted heads often furnished with a small leaf at their base, male calyx fulvo-sericeous on the outside, segments triangulari-ovate, petals of the male flowers small obovate or spathulate albido-hispid, disk crenate, rudiment of ovary tricuspidate, fulvo-hirsute, capsule as in C. pallidus. Amanoa robusta, *Thw. MSS.* Cleistanthus, *DC. Prod.* xv. 504.

Ceylon, common in the plains about the south of the island.

3. CLEISTANTHUS FERRUGINEUS, *Thw.*—A small tree, the younger parts ferrugineo-pilose, stipules small, leaves subcoriaceous oblong obtusely rostrato-acuminate, glabrous above shining opaque beneath slightly pilose, veins and veinlets prominent, 2-5 inches long, petioles 2-3 lines long, flowers axillary glomerate ferrugineo-pilose, petals glabrous, rudiment of ovary subtrilobate, capsule stipitate ferrugineo-tomentose a little depressed 4 lines in diameter, stipe 1 line long. Amanoa ferruginea, *Thw. En. Pl. Zey.* 280. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, central provinces, up to 3000 feet elevation.

4. CLEISTANTHUS PALLIDUS, *Thw.*—A small tree, the young parts pale fulvo-pubescent, stipules small, leaves oblong lanceolate acuminate mucronate, acute at the base, glabrous above, a little hairy beneath, submembranaceous, 1½-5 inches long by ¾-1¾ broad, petioles 2-3 lines long, flowers axillary glomerate adpressedly albido-pilose, heads few-flowered, flowers large, calyx, &c. as in the genus, petals glabrous, rudiment of ovary tricuspidate, capsule subsessile, a little depressed, about 3 lines in diameter pale fulvo-pilose. Amanoa pallida, *Thw. En. Pl. Zey. p.* 280. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, Hanguranketty, near Kandy.

Analysis, Pl. XXIII, fig. 4.

12. Inflorescence.
13. A female flower bud.
14. Female flower.
15. Calyx of female flower opened, shewing disk and 5 small petals.
16. Ovary, 3-bifid styles.
17. The styles removed from the hairy ovary, showing that they are slightly joined at the base.
18. A petal from the female flower.
19. Ovary cut transversely, 3-celled cells 2-ovuled.
20. Ovary cut vertically, ovules attached to centre of axis.

5. CLEISTANTHUS ACUMINATUS, *Thw.*—A small tree, glabrous, leaves elliptic, ovate or rotundate rostrato-acuminate glabrous, 1½-3 inches long by 1-1½ inches broad, primary veins 5-7 on each side prominent beneath, petioles scarcely 2 lines long, flowers axillary sessile in crowded heads rarely on spike-like branchlets, pale glabrous, calyxes of both sexes equal scarcely 1 line long, white smooth, segments oblongo-triangular, petals oblong glabrous toothed at the apex, rudiment of ovary pubescent, the disk in the female flower shorter than the petals dentate or crenulate, ovary globose densely pubescent, capsule sessile a little depressed broader than long sparingly pilose. Amanoa acuminata, *Thw. En. Pl. Zey. p.* 428. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, Galle and Colombo.

* * *Stipules large equalling or exceeding the petals.*

6. CLEISTANTHUS MALABARICUS, *Mull.*—A small tree, ramuli rufo-villous at length glabrous, stipules 2-2½ lines long linear-lanceolate subulato-acuminate longer than the petioles, petioles scarcely more than 1 line long densely rufo-villous, leaves 3-5 inches long by 1-1½ inch broad obovato-lanceolate, shortly cuspidato-acuminate, above at length glabrous, beneath rufescenti-pubescent, primary veins 7-10 on each side often flexuose distant, flowers in sessile axillary few-flowered heads, calyx about 2 lines long glabrous, segments narrow lanceolate, petals narrow obovato-spathulate 3-lobed above, ovary furnished with longish fulvous hairs, fruit globose 3-celled fulvo-pilose. *DC. Prod.* xv. 508.

Malabar and Concan.

7. CLEISTANTHUS STIPULARIS, *Hook.*—A small tree or large shrub, young branches slightly tomentose, stipules tomentose lanceolate acuminate equalling the petioles and often tufted at the apex of the branches and then 3-5 lines long, petioles 2 3 lines long, leaves about 2 inches long by 1¼-1½ inches broad, ovate or ovato-elliptic obtuse and subcordate at the base glabrous above and opaque, griseo-tomentose beneath, flowers shortly pedicelled in axillary heads, calyx segments triangular ovate subtomentose on the outside, petals of the male unguiculate triangulari-obovate subentire puberulous on the back, disk very shortly free above crenate, rudiment of ovary 3 lobed. Briedelia stipularis, *Hook. et Arnt. Bot. Beech. p.* 211—(not *Linn.*) Cleistanthus, *DC. Prod.* xv. 509.

Nilgiris.

LEBIDIEROPSIS. MULL.

Gen. Char. The structure of the flowers exactly as in Cleistanthus, fruit capsular, seed ecarunculate exarillate not impressed at the hilum, sparingly albuminous, embryo straight, radicle short, cotyledons plane fleshy suborbicular.

This genus differs from Cleistanthus in its embryo and from Briedelia in its fruit.

1. LEBIDIEROPSIS ORBICULARIS, *Roth.*—A small tree, monœcious or rarely diœcious, ramuli griseo-pilose, at length glabrous, leaves oval or suborbicular, generally 2-3 inches long by 1½-2 broad, sometimes up to 5 inches long, glabrous in age or a little pubescent on the veins beneath, submembranaceous, petiole 2-4 lines long, flowers in subsessile axillary heads slightly pilose, male and female mixed or in separate heads, bracts several minute, calyx segments oblongo-triangular ovate, petals very minute, capsule nearly 1 inch long subglobose somewhat 3-lobed very hard glabrous, seed globose. Andrachne orbicularis, *Roth. Nov. Plant. Ind. or p.* 364. Lebidieropsis, *DC. Prod.* xv. 509. Cluytia collina, *Roxb. Fl. Ind.* iii. 732.

Very common in dry subalpine forests on both sides of the presidency; called Wodesha in Teligu (in the Circars), and Wodayu in Tamil (Palghat), also in Ceylon, where it is called Madara, and in Bengal; the wood is exceedingly hard and durable, of a

red color, very even grained, very easily worked ; it is much in use by the natives ; the outer shells of the capsules are said to be very poisonous.

Analysis, Pl. XXIII, fig. 5.

1. A branch bearing flowers and 1 fruit.
2. Inflorescence.
3. A flower bud, sepals valvate.
4. A full flower.
5. A flower open, shewing the structure just as in Cleistanthus, 1 petal removed and shewn separately.
6. Calyx opened out, shewing disk and petals.
7, 8. Anthers.

TRIBE CROTONEÆ.

CROTON. LINN.

For Gen. Char. see letter-press to Pl. cclxxxiii.

Sec. EUCROTON.—*Calyx pentamerous, segments equal, petals in the male 5, male receptacle pilose.*

1. CROTON SCABIOSUM, *Bedd.*—For description, &c. see Pl. cclxxxiii.

2. CROTON OBLONGIFOLIUM, *Roxb.*—A middling sized or small tree, young branches and the young leaves and inflorescence densely covered with silvery scab-like scales, leaves penniveined silvery-lepidote glabrous in age with a lateral depressed gland on each side at the base underneath, elliptic or oblong to ovate or obovate acute or acuminate serrate, crowded towards the apex of each branch, 6-12 inches long scarcely coriaceous, primary veins 16-20 on each side, petioles 1-1¾ inches long, stipules rigid subulate small, racemes terminal many flowered 2-6 inches long, bracts 1-3 flowered the male flowers above crowded, the female below distant, the female pedicels much thicker than the male, petals subulate woolly. Stamens 10-12, filaments woolly near the base, styles 3 each deeply bifid, segments entire or emarginate, slender variously flexuose. Capsule subglobose slightly 3-lobed lepidote about 3 lines long. *Roxb. Fl. Ind.* iii. 685 ;—*DC. Prod.* xv. 573.

A rather rare tree in our western forests, found also on our eastern mountains and widely distributed throughout Bengal and Birmah, also cultivated in native gardens.

3. CROTON MALABARICUM, *Bedd.*—A tree 20-30 feet high, the whole plant very silvery, leaves alternate oblongo-ovate, ovate to rhomboeo-ovate acuminate, entire above, in age very sparingly covered with grey stellate scales or rarely quite glabrous, beneath very silvery and densely matted with scales, primary veins 6-7 on each side raised and prominent beneath, glands 2 very small immersed at the base on the underside, 2-6 inches long by 1-3 broad, petioles 1-2 inches long silvery but also with rusty scales. Stipules setaceous 6-9 lines long, racemes terminal solitary or 2-3 together about 2 inches long, the upper half male the lower half female silvery as are the flowers, disk of 5 lobes present in both sexes but very inconspicuous in the dense wool. *Male* : petals less than a third the size of the sepals woolly, stamens 10. *Female* : no petals, styles 3 each 2-cleft to nearly the base, the arms filiform blackish glabrous or subglabrous in age, fruit obovoid fusco-stellate, about 1 inch long by 8 lines wide, slightly raised above the calyx on a stalk 1 line long (base of the central column which runs up between the cocci and which is persistent after they fall off), fruiting calyx scarcely enlarged. *Bedd. Icones Part* x. *Pl.* clxxxi.

This tree is common in all our western forests up to 4000 feet elevation ; it has the same silvery appearance as reticulatum (hypoleucos, *Dalz*), but is a tree instead of a small shrub, has much larger leaves and very different glands, fewer stamens, larger fruit and different style ; it answers very exactly to Roxburgh's description of C. bicolor, except in its shorter racemes, but I dare not give it that name, as that species is from Sumatra only ; but I should not be surprised if it turns out to be identical with it.

4. CROTON AROMATICUM, *L.*—is a very scabrous shrub or small tree (sometimes a creeper) most abundant throughout Southern India and in Ceylon ; with this I am inclined to join lacciferum, *L.*, and caudatum., *Geisel.* (drupaceum, *Roxb.*) I have most copious specimens from all parts of the peninsula and Ceylon, and I have quite failed in all attempts to separate them : the stamens vary from 10 to 30 on the same individuals, and the fruit varies much in size. C. Moonii, *Thw*, and C. nigro-viridis, Ceylonese shrubs or small trees, are not satisfactorily distinct, and should, I think, only be considered varieties.

5. CROTON RETICULATUM, *Wall*—is a small shrub with the leaves very white and silvery underneath, common in our western moist forests up to 4000 feet elevation ; from this I cannot distinguish C. Zeylanicum of DeCandolle, a Ceylon species.

6 CROTON KLOTZSCHIANUM, *Wight Icones* 1914.—A small tree or shrub, considered by DeCandolle as a variety of C. caudatum, is quite distinct. I have abundant specimens from South Canara, Coorg, Courtallum and the Nallay Mallays (Kurnool district), and with these C. Thwaitesianum, *DC.*, a Ceylon plant, quite agrees ; they have all of them 10 stamens, a 5 lobed inconspicuous disk present in both sexes, very filiform deeply cleft styles, and very inconspicuous filiform petals in the female or entirely wanting. As a species it is scarcely distinct from Croton tiglium, which I only have from Ceylon (Badagam), but the latter has larger and broader leaves and 12 stamens.

TRIBE ACALYPHEÆ.

ALEURITES. Forst.

For Gen. Char. see letter-press to Pl. cclxxvi.

Aleurites Moluccana, *Willd.*—For description, &c. see Pl. cclxxvi.

AGROSTISTACHYS. Dalzell.

Gen. Char. Male calyx regularly valvate, 3 or more rarely 4-parted, female calyx 5-parted imbricate, petals in the male double the number of the calyx-segments, in the female equal in number, glands of the disk equal in number to the petals alternate with them. Stamens generally 12 (rarely 8-13) joined at the very base into a ring and verticelled in 2 rows round the base of the 2-parted rudiment of an ovary, anther-cells free nearly to the apex, pendulous from the connectivum, unequally 2-valved. Ovary 3-celled, cells 1-ovuled, styles 3 connate at the very base bifid, the branches diverging and papillose. Capsule 3-coccous cocci bivalved. Shrubs or trees, diœcious, leaves bistipulate alternate simple penniveined. Male flowers in supra axillary spikes, female solitary from each head of bracts generally several arranged in a line along the stem above the axils. *Dalzel. in Hook. Journ. of Bot.* 1850 *p.* 41.

1. Agrostistachys Indica, *Dalz.*—A small tree up to 15 feet high, leaves subcoriaceous or coriaceous, 5-15 inches long by 1-6 inches broad, from narrow lanceolate elliptic to very broadly ovate, very coarsely serrated with the serratures incurved, or sometimes quite entire, margin much thickened, glabrous on both sides, primary veins very prominent and thick very variable in number, transverse veinlets also very prominent, petioles up to 2½ inches long, stipules ovato-lanceolate subulate acuminate striated soon deciduous, bracts broadly triangulari-ovate acute concave sericeous, petals obovate, connective obtuse produced beyond the anther-cells. Ovary hairy. *Dalz. l. c.*

Very common in our dense Ghat forests from Canara down to South Tinnevelly, 3-5000 feet elevation, also on the Bombay ghats, and in Ceylon 1-2000 feet elevation, and in Birmah and the Andamans.

Analysis, Pl. XXIII, fig. 2.

1. Male inflorescence, flowers in axillary spikes.
2. A male flower bud, sepals 3 valvate.
3. A male flower with the bracts at the base.
4. A full male flower, petals 6 (rarely 8) obovate, disk of 5 glands. Stamens 12 (sometimes 8-10-13) joined at the base into a ring and verticelled in 2 rows round the base of the 2-parted rudiment of an ovary.
5. Base of the stamens, shewing that they are connate into a ring.
6, 7. Anthers, front and back view, cells unequal divaricate subpendulous.
8. A petal.
9, 10. Female inflorescence, the flowers on the stems in a line above the axils, bracts 1 flowered.
11. Female flower bud with its bracts, sepals imbricate.
12. A full female flower, sepals 5, petals 5, alternate with the glands and sepals, styles 3 connate at the very base, each 2-lobed, ovary hairy.
13. Ovary cut vertically, showing the ovules and young embryo, the former adnate to the centre of the axis.
14. Ovary cut transversely, cells 1 ovuled. (All drawn from living specimens.)

SARCOCLINIUM. Wight.

Gen. Char. Male calyx 5-parted valvate, female 5-4 parted imbricate, petals in both sexes alternate with the calyx-segments, imbricate; disk present in both sexes 5-glandulose, the glands alternate with the petals, in the female eventually cohering together at the base, stamens 10 central biverticellate the 5 exterior opposite the petals, the 5 interior opposite the calycine segments, the filaments connate at the base, the column 3-2-cleft and style-like at the apex, anther-cells pendulous from the apex of the filament. Ovary 3 celled, styles 3 connate at the base 2-4-fid, ovary cells 1-ovuled, ovules pendulous, capsule 3-coccous, seed ecarunculate, embryo in the middle of copious albumen, cotyledons plane orbicular, radicle cylindric as long as the cotyledons. Small trees, leaves bistipulate large penniveined, entire or serrate, coriaceous, flowers diœcious in axillary racemes. *Wight. Icones* 1887-8.

1. Sarcoclinium longifolium, *Wight*—A small or middling sized tree, very glabrous, stipules 1 line long, broadly ovate subcoriaceous deciduous, leaves rigid coriaceous narrow-obovato-spathulate, up to 1½ feet in length by 3½ inches broad towards the apex, terminating in a short very blunt point, quite entire glabrous, primary veins 16-19 very prominent beneath, impressed above, veinlets inconspicuous, petiole up to 2 inches long much compressed or winged, racemes erect shorter than the leaves (6-9 inches long) the male bracts 3-flowered, the female glanduloso-dentate 1-flowered, female pedicels articulate about the middle. Male calyx-segments entire, female glanduloso-denticulate, petals of male truncate and somewhat lobed at the apex, petals of female obovate, ovary pubescent, styles slightly connate at the base, capsule broad depressed tricoccous about 3-4 lines broad. *Wight l. c.*

Common in all our Western Ghat moist forests from Canara down to South Tinnevelly at 2-4000 feet elevation, also in Ceylon 4-6000 feet.

Analysis, Pl. XXIII, fig. 1.

1. Portion of a male raceme, bracts 3-flowered viscid.
2. A male flower bud, calyx segments valvate entire.
3. Male flower more advanced.
4, 5. Full male flowers, petals 5 alternate with the sepals truncate and lobed at the apex. Stamens 10 in 2 rows, the lower 5 free and opposite the petals, the upper 5 connate round the abortive ovary, disk of 5 glands alternate with the petals, apex of the abortive ovary 2-cleft.
6, 7. Anthers, front and back view, cells pendulous from the apex of the filament.
8, 9. Petals.
10. Portion of a female raceme, bracts 1-flowered viscid.
11. A female flower, calyx-sepals imbricate glanduloso-denticulate, disk of 5 glands alternate with the petals, petals crenulated but not so truncated as in the male. Styles 3 connate at the very base, 2-cleft at the apex.
12. Ovary cut vertically, cells 1-ovuled, ovules pendulous from near the apex of the axis.
13. Young fruit.
14. The styles removed, shewing that they are connate at the very base only. (All drawn from living flowers.)

2. Sarcoclinium Hookeri, *Thw.*—A middling sized tree, leaves glabrous rather coriaceous shining cuneato-lanceolate suddenly and finely acuminate serrulate penniveined, 2-3 feet long by 5-7 inches broad, primary veins 7-8 lines distant from each other parallel, petioles ¾-1 inch long, stipules lanceolate acuminate 1½-2½ inches long striated fuscous, *female* racemes about as long as the leaves pendulous glabrous, pedicels solitary 5-6 lines long articulated below the middle, sepals triangular scarcely exceeding the large annular disk, ovary obtusely trigonal minutely tomentose, style short thick 3-parted from the middle, lobes stigmatose on the inside emarginate at the apex, the cocci of the capsule rounded. Seed spherical half an inch each way. Male flowers not seen. *Thw. En. Pl. Zey. p.* 279.

Ceylon, near Eknalagodde in the Ratnapoora district, called Mahabairoo.

CÆLODISCUS. Baillon.

Gen Char. Male calyx 4-5 parted valvate, female irregularly 3-5 fid, deeply open on one side, petals none. Stamens numerous inserted round a central glandulose concave disk, anthers introrse 2-celled, filaments free or irregularly and shortly polyadelphous, connective not produced, rudiment of ovary none, no hypogynous disk, ovary 5-3-celled. Styles 5-3 simple papillose on the inside. A genus with the habit of Mallotus, but differing in the presence of a central disk; the fruit is unknown.

1. Cælodiscus Thunbergianus, *Mull.*—A shrub or tree? ramuli terete compressed, smooth glabrous, the younger ones more compressed and sulcato-angulose slightly tomentose. Stipules small subulate, leaves opposite ovate acutely cuspidato acuminate rounded at the base and slightly cordate or very shortly contracted and narrow, the young ones membranaceous pubescent with very short stellate hairs, in age glabrous above shortly aspero-puberulous on the costa and veins beneath, margin entire or very slightly crenulate or even repando-denticulate, furnished below with very minute shining glands, petioles unequal one being about 9 lines and the other only 3 lines long, racemes long peduncled, rachis slender ferrugineo-puberulous shorter than the leaves, flowers in distant fascicles, bracts short few flowered. Male calyx a little more than 1 line long, when open narrowed at the base densely and shortly ferrugineo-tomentose. Stamens about 100, anthers apiculate, connective glandulose, filaments stoutish connate in bundles, central disk broad, female flowers and fruit unknown. *DC. Prod.* xv. 758.

Ceylon. I have never seen this plant, and it has not been found by Mr. Thwaites.

CEPHALOCROTON. Hochst.

For Gen. Char. see letter press to Pl. cclxi.

§ Sec. Adenochlœna.—*No hypogynous disk. Stamens in a single verticel equalling in number the calyx segments.*

1. Cephalocroton Indicum, *Bedd.*—For description, &c. see Pl. cclxi.

2. Cephalocroton leucocephalum, *Baill.*—A shrub or small tree, all the young parts furnished with hoary stellate pubescence, leaves triangulari-ovate long cuspidato-acuminate, broadly subtruncate and cordate at the base, entire membranaceous, 2-4 inches long by 1¾-3 inches broad, petioles slender 2-3½ inches long, stipules cut down into filiform teeth, peduncles shorter than the petioles. Male flower heads 2½-3½ lines broad Male pedicels short, the calyx segments thick acute, rudiment of ovary quadrangulari compressed subcapitate at the apex, female calyx segments deeply laciniate much enlarged under the fruit, segments rigid compressed glandular, style column equalling the ovary, styles twice bifid, capsule ½ an inch broad about 4 lines long deeply 3-lobed hoary. Seed globose smooth. *DC. Prod.* xv. 762.

Nilgiris. I have never found this species.

3. Cephalocroton Zeylanicum, *Baill.*—A suberect shrub sparingly branched, young parts clothed with white stellate pubescence, ramuli elongate weak, leaves oblongo-lanceolate acuminate broad at the base and truncate or subcordate 3-nerved, 3-7 inches long by 1-3 inches broad, petiole ½-3 inches long, stipules subreniform. *Male* flowers small densely glomerate at the apex of the peduncle. Stamens 4-5, anthers extrorse, rudiment of ovary cylindric entire truncate; *female* flowers 1-3 at the base of the peduncle, segments 4-5 unequal lanceolate, in fruit much enlarged and pectinato-laciniate, the laciniæ long setaceous thickened at the apex, ovary pilose. Style 3-lobed large deciduous, lobes copiously and deeply laciniate, capsule 3-lobed a little depressed, cocci rotundate,

Croomb, del. Humphry, lith.

Croton lobatus calycina (Roxb.)

see Monadelphia Euphorbiaceae

seed subspherical 2 lines in diameter marked with brown and black. *Baillon Rec. d'Obs. Bot. vol.* v. *p.* 148 ;—*DC. Prod.* xv. 762. Centrostylis Zeylanica, *Bail. etud. Gen. Euph. p.* 470. Adenochlœna Zeylanica, *Thw. En. Pl. Zey. p.* 270.

Ceylon, at Rambodde and Happootalle in the central provinces, at 4000-5000 feet elevation.

CÆLODEPAS. Hassk.

Gen. Char. Male calyx 3 4-fid valvate, female 4-5-10 parted imbricate, petals and disk none in either sex. Stamens 4-6 inserted round the rudiment of an ovary opposite the calyx lobes or the exterior alternate with them, anthers 2-celled, the cells distinct pendulous introrse, filaments thick, ovary 3-celled, cells 1-ovuled. Styles 3 broad deeply bilobed or sub-hexagynous, lobes multidentate. Capsule tricoccous, cocci bivalved. Seed ecarunculate albuminous. Trees, leaves alternate simple serrate often biglandular at the base. Male flowers on filiform spikes, female solitary, stipules serrate or pectinate. *Hassk. in Fl. Ratisb.* 1857, *p.* 531 ;—*DC. Prod.* xv. 759. Koilodepas, *Hassk. in Bot. Zeit. p.* 802.

1. Cælodepas calycinum, *Bedd.*—A small tree, young parts furnished with scurfy pubescence, stipules longer than the petioles pinnatifid, leaves alternate oblongo-lanceolate with a longish acumen, glabrous or subglabrous in age, when young sparingly furnished particularly on the costa and veins beneath with stellate scurfy tomentum, margins crenate sometimes furnished with 2 glands at the base on the underside, 3-7 inches long by ¾-2½ inches broad, penniveined, primary veins 8-11 on each side, petioles scurfy about 3 lines long. *Male* paniculate, spikes 3-4 inches long crowded or several together axillary or from the old axils or terminal, incano-pubescent, flowers very minute 3-8 in interrupted sessile heads. Calyx 4-cleft valvate hoary outside, petals 0. Stamens 4-5, filaments very flat contracted at the apex adnate for about ⅔rds of their length to the fleshy base of the abortive ovary, free above, anther-cells divaricate, abortive ovary thick and fleshy below and adnate to the filaments produced above into a short 3-4 lobed column. *Female* flowers solitary axillary or above the axils pedicellate, the pedicel 3-4 lines long bracteate at the base, calyx 5-7 lobed imbricate stellately pubescent, disk and petals 0. Ovary pubescent 3-celled, cells 1-ovuled, ovules pendulous, styles 3-6 flat dilated 2-cleft plumose, capsule 6 8 lines in diameter surrounded by the much enlarged calyx, 3-lobed, the cocci rounded stellately pubescent. Adenochlœna, *Bedd. in distr.*

Paupanassum, and elsewhere foot of the Tinnevelly hills, called Kàtpira ; wood very hard. This will probably form a new genus between Cœlodepas and Cephalocroton ; the male flowers are very minute.

For figure, vide tab. cccxx.

Analysis.

1. A stipule.
2. A male flower, sepals 4 valvate, stamens 4, filaments broad flat fleshy more or less monadelphous below and closely cohering to the fleshy base of a rudimentary ovary which is 4-lobed at the apex, free above and much attenuated at the apex, anthers introrse, cells pendulous distinct.
3. A male flower, sepals removed, the stamens pressed down to show that the filaments are adnate with the base of a 3-lobed rudimentary ovary ⅓rds of the way up.
4. A male flower, sepals removed, shewing 5 stamens.
5. 2 of the stamens (separated from the fleshy base of the rudimentary ovary) inside view.

6, 7, 8. Female flowers, sepals 5 imbricate, stigmas 3-5 large flat 2-cleft.

9. Ovary cut vertically, ovules pendulous.
10. Ovary cut transversely, 3 cells each 1-ovuled.

11, 12. Young fruit, sepals much enlarged.

SYMPHYLLIA. Baillon.

Gen. Char. Male calyx 3-6 parted valvate, female 5-6-parted imbricate, petals and disk none in either sex. Stamens equal in number to and alternate with the calycine segments, inserted round the columnar rudiment of an ovary, anthers erect 2-celled introrse basifixed, filaments free. Ovary 3-rarely 2-celled, cells 1-ovuled, styles 3-2 shortly connate into a column divaricately spreading above, dense fimbriato-papillose on the inside ; fruit capsular, fleshy when young, mature fruit unknown. Shrubs, leaves crowded at the tops of the branchlets, often subverticelled minutely stipulate sessile or short petioled penninerved membranaceo-subcoriaceous minutely denticulate or entire, flowers monœcious in spike-like terminal panicles bearing a few female flowers at the base, or in the uppermost axils of the leaves. *Baillon Etud. Gen. Euph. p.* 473.

1. Symphyllia mallotiformis, *Mull.*—A small tree or shrub, leaves short petioled alternate, oblongo-elliptic acute entire, beneath scarcely paler and not punctato-glandulose, when young puberulous with minute stellate hairs, in age glabrous, 3-4½ inches long by 1-2 inches broad, not crowded at the apex of the branches, spikes a little shorter than the leaves, flowers in dense heads, male numerous shortly pubescent, female flowers and fruit unknown. *Mull. Arg. in Linnœa, vol.* 34. 156 ;—*DC. Prod.* xv. *p.* 764.

Nilgiris, southern slopes. I have never met with this plant ; it is said to be very like Mallotus Lawii, but has alternate instead of opposite leaves, and is destitute of the punctate glands beneath,

PODADENIA. Thw.

For Gen. Char. see letter-press to Pl. cclxxxii.

1. Podadenia Thwaitesii, *Baill.*—For description, &c. see Pl. cclxxxii.

TREWIA. LINN.

For Gen. Char. see letter-press to Pl. cclxxxi.

1. TREWIA NUDIFLORA, *Linn.*—For description, &c. see Pl. cclxxxi.

MALLOTUS. LOUR.

For Gen. Char. see letter-press to Pl. cclxxxix.

Sec. MELANOLEPIS.—*Disk present in the female flowers and sometimes in the male, connective obconical truncate.*

1. MALLOTUS BARBATUS, *Mull.*—A shrub or small tree, ramuli, the costa of the leaves and capsules densely covered with floccose tomentum, leaves peltate 3-lobed, lobes shortly triangular acute repando-denticulate, rotundato-obtuse at the base, 8 12 inches each way, above stellately pubescent, beneath stellately tomentose, subfloccose on the veins, petioles nearly as long as the leaves. Female flowers in simple elongated racemes, calyx 4-cleft, hypogynous disk short furnished with 1-8 stiff laciniæ which are thickened at the apex, capsule very densely and softly ferrugineo-echinate, exactly globose, equalling the pedicel in length, 3-4-coccous, about 4-5 lines in diameter. Seeds nearly 2 lines long ellipsoid subtuberculate shining, female flowers and fruit unknown. *Mull. Arg. in Linnæa vol.* 34. *p.* 184 ;—*DC. Prod.* xv. 957.

Concan ghats (Bombay), also in Birmah and Singapore, (unknown to me.)

MALLOTUS MOLLUCCANUS, *Linn.*—A small tree, young ramuli, young leaves and inflorescence densely covered with short subfloccose tomentum, at length glabrous, leaves alternate not peltate at the base elobate or subtrilobed, 2½ to 6 inches long by not quite as broad, broad-rhomboid-ovate acuminate shortly contracted or subcordate at the base, mucronato-dentate with a cluster of small dark colored glands at the base on the upper side, more or less stellato-tomentose underneath, petioles a little shorter than the leaves, flowers monœcious or diœcious, racemes paniculate, the branches few elongate densely stellato-tomentose, bracts of both sexes 1-3-5 flowered, pedicels exceeding the calyx. *Male* calyx 1¾ lines wide, stamens about 200, the receptacle hemispherical stellato-pubescent, anthers with an obovate connective at the top. *Female,* the hypogynous disk urceolate thick stellato-pubescent crenate, ovary 2-celled, ovules pendulous, style 2-cleft, divisions recurvate. Capsule nearly ½ inch wide densely subpulveraceo-stellato-tomentose. Seed globose foveolate of a dark brown, nearly 2 lines in diameter. Croton Moluccanus, *Linn. Sp. Pl. ed.* 1. *p.* 1005. Mallotus, *DC. Prod.* xv. 958. Croton multiglandulosum, *Reinw.* Rottlera, *Bl.* Melanolepis, *Reichenb.* Ricinus dicoccus, *Roxb. Fl. Ind.* iii. 690.

South Arcot, also in Java, Borneo, Timor and the Philippines.

3. MALLOTUS ERIOCARPUS, *Thw.*—A shrub, ramuli, petioles and inflorescence rufo-tomentose with dense stellate hairs, leaves membranaceous opposite ovate to oblongo-lanceolate entire or a little undulate and crenulate, 3-nerved, beneath sparingly aureo-puncticulate, softly stellato-pubescent on both sides at length asperulous above, rounded or subcordate at the base, 2-8 inches long by 1-4 inches broad, petioles ½-2 inches long. Male spikes half or scarcely half as long as the leaves bearing 5-10 flowered verticels, bracts small, male calyx conico-ovoid subacute, stamens about 40, connective not produced, ovary surrounded with numerous staminodes. Style-lobes 3 plumose on the inside, capsule tricoccous armed with numerous pilose soft aculei, cocci subspherical. Rottlera eriocarpa, *Thw. En. Pl. Zey.* 273. Mallotus, *DC. Prod.* xv. 959.

Ceylon, hot and drier parts of the island, not very common.

Sec. EUMALLOTUS.—*Disk none, anthers introrse not truncate.*

* *Capsule softly echinate.*

4. MALLOTUS ALBUS, *Roxb.*—A middling sized or small tree, young branches, petioles, young leaves and inflorescence densely covered with short rusty or whitish stellate tomentum, leaves a little peltate or epeltate, in age nearly glabrous above, very rusty beneath, broad-triangulari-ovate rarely lobate shortly acuminate, furnished with 2 or sometimes 3-4 glands at the base on the upper side, subentire or repando-denticulate, the leaf without the petiole 4-8 inches long by nearly as broad, palmate-nerved at the base penniveined above, petioles generally a little shorter than the leaves, inflorescence diœcious in terminal paniculate spikes very elongate and lax in the male, shorter and rather rigid in the female, bracts inconspicuous triangular ovate, male flowers in small sessile heads which are 3-many flowered, female flowers solitary and larger. Male calyx 3-4 or rarely 5-parted, stamens about 80, female calyx unequally 4-5 parted deeply connate. Ovary 4-celled densely ferrugineo-stellato-tomentose at length softly echinate, the echini stellato-floccose, stigmas flat nearly 3 times as long as broad very papillose, capsules subsessile tetracoccous about 4 lines broad. Rottlera alba et tetracocca, *Roxb. Fl. Ind.* iii. 829 *and* 826. Mallotus alba, *DC. Prod.* xv. 965. Rottlera peltata, *Wight Ic.* 1873. Rottlera mappoides, *Dalz. in Hook. Journ. of Bot.* 1851.

Very common throughout our western forests, Mysore, &c. up to 4000 feet elevation, also in Ceylon (called Bookanda) and in North India, Sumatra and Borneo. I do not know Mallotus Roxburghianus, *DC.* (Rottlera peltata, *Roxb.*), and if distinct from this (it is described as having racemes instead of panicles and linear subulate bracts), it is not a South Indian tree. Wight's Rottlera peltata, referred by DeCandolle to M. Roxburghiana, certainly belongs to the plant here described.

5. MALLOTUS MURICATUS, *Wight.*—A large shrub or small tree, diœcious, young parts densely covered with ferrugineous resinous little disks and sparingly and shortly puberulous, but soon destitute of hairs, petioles opposite often very unequal in length up to 1½ inches long, leaves up to 10 inches long by 4 broad but not generally quite as large, lanceolato-elliptic to ovato-elliptic with a long acumination repando-dentate, rigidly membranaceous, beneath densely glanduloso-punctate, and furnished near the base on the

upper side with 2-4 large glands, penniveined, primary veins very prominent, flowers spicato-racemose, female racemes elongate terminal soon becoming lateral by the further development of branches, male amentiform longer than the petioles, bracts short broad concave, male calyx globose, segments 3 suborbicular, segments of female calyx narrow-lanceolate slightly connate at the base, stamens about 50, ovary globose muricato-echinate, echini soft pilose, style-column very short. Capsule 3-coccous each armed with 2 rows of excrescences. Claoxylon muricata, *Wight Icones* 1886. Axenfeldia intermedia, *Baill. Etud. Gen. Euph. p.* 419. Rottlera muricata, *Thw. En. Pl. Zey. p* 273.

Very common in the moist forests of our Western Ghats from Canara down to South Tinnevelly.

6. Mallotus stenanthus, *Mull.*—A large shrub or small tree, petioles opposite unequal, leaves lanceolate acuminate acute at the base repando-denticulate or entire rigidly membranaceous, beneath resinoso-puncticulate subglabrous, furnished with several glands at the base on the upper side, racemes of the male axillary short, bracts small ovate, flowers nearly sessile, calyx oblongato-ellipsoid glandular, segments 3 narrow elliptic, stamens 18-20, female flowers and fruit unknown. *DC. Prod.* xv. *p.* 972.

Bombay ghats, &c. (unknown to me.)

7. Mallotus micranthus, *Mull.*—A shrub or small tree, ramuli and petioles obscurely fulvo-pubescent at length glabrous, petioles ½-1 inch long opposite and alternate, leaves 3-5 inches long 1-2 inches broad, elliptic lanceolate subentire sparingly glanduloso-punctate below, rigidly membranaceous glandularly maculate at the base above, the costa beneath pubescent, primary veins 4-5 on each side, male racemes terminal and axillary much shorter than the leaves densely flowered, bracts lanceolate acuminate small few flowered, calyx globose tomentose only ½ a line long, stamens about 50, connective very obtuse rather prominent, female flowers and fruit unknown. *DC. Prod.* xv. 971.

Ceylon. Differs from muricata, stenanthus and Lawii (to which it is allied) by its very much smaller flowers; the primary veins are also much fewer, (unknown to me.)

8. Mallotus aureo-punctatus, *Dalz.*—A shrub or small tree, young parts puberulous, leaves opposite penniveined lanceolato-elliptic acuminate glabrous and shining above, furnished beneath with a few stellate hairs on the costa and numerous golden resinous dots over the whole surface, 2½-6 inches long by 1-1½ broad, furnished with 3-7 glandular black dots at the base on the upper side, primary veins 8-9 on each side, the lower ones much shorter, petioles generally unequal in length, 3-5 lines, flowers racemose golden dotted, racemes simple axillary and terminal shorter than the leaf. Male flowers fascicled about 5 together, calyx 4 divided, segments broadly ovate reflexed, female racemes 4-5 flowered, calyx spathaceous split on one side, capsule 9 lines in diameter clothed with soft hairy bristles. Rottlera aureo-punctata, *Dalz. in Hook. Journ. of Bot.* iii. 122. Mallotus, *DC. Prod.* xv. 973.

Anamallay forests, Bombay ghats.

9. Mallotus Lawii, *Mull.*—A small tree or large shrub, branches slender obscurely fulvo-puberulous at the apex, petioles opposite 2-3 lines long puberulous, leaves about 4 inches long 1-1½ inches broad, elliptic or obovato-lanceolate often subfalcate cuspidate at the apex, repando-denticulate furnished with black spots at the base, in age glabrous aureo-puncticulate beneath, penniveined, the lower veins shorter, flowers diœcious spicato-racemose, racemes axillary long, the male bracts 3-7 flowered, the pedicels fasciculate articulated at the apex puberulous. Calyx about 1 line long acute pubescent 3 parted, stamens 50-60, connective obtuse or apiculate a little exceeding the anthers, female racemes few flowered, bracts ovate acute. Calyx spathaceous at length deeply 1 2 parted, ovary densely echinate with longish soft hairy weak bristles, the style-column very short. *DC. Prod.* xv. 974.

Malabar and Concan. Very similar to muricatus and stenanthus, but the female calyx spathaceous and the style-column shorter. I have never found this species.

* * *Fruit unarmed.*

10. Mallotus distans, *Wall.*—A straggling weak shrub, young branches, petioles and inflorescence densely clothed with short soft greenish stellate tomentum, petioles opposite very unequal, ¾ to 2 inches long (one of them generally twice as long as its fellow), leaves membranaceous 3-nerved, 3-7 inches long by 2-3½ broad ovate or rhomboido-ovate, generally acute at the apex, very slightly peltate at the base, and there furnished on the upper side with 2-6 large black glands, in age glabrous above, beneath softly and densely stellato-pubescent and often minutely and inconspicuously aureo-puncticulate, bracts linear, *female* racemes as long or longer than the leaves slender drooping 3-6 flowered, flowers distant solitary pedicelled, pedicels about 3 lines long, (or elongate?) *male* spikes as long as the female racemes with distant sessile 4-10 flowered heads or fascicles each subtended by a single bract, female calyx 3-5 parted, ovary densely and softly stellato-tomentose. Capsule 3-lobed 4-5 lines in diameter stellately-fulvous. Croton distans, *Wall. Cat.* 7772*A*. Mallotus, *Mull*;—*DC. Prod.* xv. 976.

Tinnevelly district, foot of the ghats. I have only found this species near Courtallum (the 5 falls).

11. Mallotus Zeylanicus, *Mull.*—A shrub or small tree, young parts clothed with stellate pubescence, leaves opposite or alternate ovate or elliptico-lanceolate acuminate entire or slightly repando-denticulate glandulosely maculate at the base, subglabrous or beneath pubescent on the costa and veins, rigidly-membranaceous, penniveined, or subtriplinerved, 2-6 inches long by 1-3 inches broad, petiole ½-1½ inch long. Male racemes spiciform stellately tomentose. Male bracts triangular very short. Stamens 30-40, connective not produced beyond the anthers, the female bracts ovate, female calyx 3-4-parted, ovary tomentose, style-column indistinct, capsule depressed 3-4-lobed about 4 lines in diameter unarmed, shortly stellato-tomentose, seed globose smooth. *DC. Prod.* xv. 977. Rottlera oppositifolia, *Thw.* (not *Bl.*)

Ceylon, not uncommon up to 2000 feet elevation.

12. MALLOTUS ATROVIRENS, *Wall.*—A shrub or small tree, petioles opposite 1-4 lines long, leaves penniveined 3-4½ inches long by 1-2 inches broad, lanceolato-obovate obtuse acute at the base, epeltate, beneath densely subferrugineo-glanduloso-punctate, above dark-brownish and glanduloso-punctate, racemes axillary, female calyx 5-parted, divisions linear-lanceolate acute, the pedicels exceeding the calyx. Male calyx globose 1 line broad glanduloso-punctate, stamens about 40, connective narrow not produced. Ovary smooth glabrous but densely covered with glands, stigma recurved spreading very papillose. Croton atrovirens, *Wall. Cat.* 7771. Mallotus, *DC. Prod.* xv. 978.

Courtallum, Tinnevelly district. (I have not found it.)

13. MALLOTUS FUSCESCENS, *Thw.*—A small tree, glabrous, the young parts and inflorescence furnished with gland-like dots, petioles opposite ½ to 1½ inches long, leaves 2½-6 inches long by 1-3 inches broad, oblongo-obovate acute epeltate at the base subentire rather coriaceous glanduloso-punctate on both sides, penniveined obscurely biglandular at the base, racemes spiciform simple terminal or from the upper axils, the male up to 1 inch long, densely flowered, calyx ovoid acute, stamens 20-25, the female a little longer many flowered, bracts very small ovate, calyx 5-parted, segments lanceolate acuminate a little longer than the male, ovary glabrous glandulose, style-column indistinct, stigmas short, capsule 4 lines broad deeply 3-lobed or sometimes 4-lobed unarmed punctato-glandulose glabrous. Seed 2 lines long subglobose smooth shining. Rottlera fuscescens, *Thw. En. Pl. Zey.* 273. Mallotus, *DC.* 978.

Ceylon, up to 2000 feet elevation.

14. MALLOTUS NITIDUS, *Mull.*—Shrub or small tree, all the young parts fulvo-puberulous soon glabrous, ramuli terete, stipules triangulari-ovate acuminate small very caducous, petioles 2-3 lines long, leaves alternate, 3-4 inches long by 1½-2 inches broad penniveined, lanceolato-obovate slightly coriaceous minutely repando-denticulate furnished with 1-2 glands at the base without resinous dots. Male spikes from the upper axils slender, flowers in interrupted heads, bracts very short broad, stamens about 80, connective broad produced, calyx subsericeo-pubescent ovoid acute, female flowers and fruit not known. *DC. Prod.* xv. *p.* 979.

Ceylon. I have never seen this species ; it has the habit of fuscescens.

15. MALLOTUS RHAMNIFOLIUS, *Willd.*—A shrub or small tree, ramuli, petioles and inflorescence softly subvelutinous at length subglabrous, petioles about 5-6 lines long, leaves alternate submembranaceous, 2-3½ inches long by 1-2 inches broad, lanceolato-ovate acuminate subcordate or obtuse at the base slightly repando-dentate, beneath furnished with shining golden glands, shortly 3-nerved, racemes spiciform 2-3 times as long as the leaves, many-flowered, female calyx small 2-3 parted, the segments somewhat cohering, stigmas short thick, capsule small about 2 lines broad depressed deeply 3-lobed ferrugineo-tomentose. Croton rhamnifolius, *Willd.* Mallotus, *DC. Prod.* xv. 979. Croton nervosus, *Rottl. et Willd.* C. reticulatum, *Willd. Sp. Pl.* 4. 545.

Southern India. I have never found this ; it has the habit of Zeylanica, but with alternate leaves.

16. MALLOTUS PHILIPPINENSIS, *Lam.*—For description, &c. see Pl. cclxxxix.

17. MALLOTUS REPANDUS, *Willd.*—A sub-scandent shrub or small tree, young ramuli, petioles and inflorescence stellately fulvo-tomentose, leaves slightly peltate triangularly or broad rhomboid-ovate acute repando-denticulate, up to 4 inches long and often quite as broad or even broader, subglabrous above, stellately tomentose beneath or at length glabrous and furnished with waxy glands, petioles ¾ to 1¾ inches long, spikes terminal panicled often longer than the leaves, bracts triangular-ovate, the male 3-flowered, the female generally 1-flowered. Male calyx globose about 1 line broad shortly pedicelled furnished with pale glands inside. Stamens about 50, female calyx cylindrico-ellipsoid when young, segments ovate at first deeply gamosepalous, at length narrow lanceolate deeply cleft, stigmas papillose. Capsule about 5 lines broad a little exceeding the pedicel, glandular dicoccous pulveraceo-tomentose, seed 2 lines long globose reticulated. Croton repandus, *Willd.* Mallotus, *DC. Prod.* xv. 981. Croton rhombifolius, *Willd. Sp. Pl.* iv. 555. Rottlera dicocca, *Roxb. Fl. Ind.* iii. 829.

Not uncommon throughout the presidency and in Ceylon and Bengal, also in Birmah, Java, the Philippines, Timor, Formosa, New Caledonia and Hong Kong.

CLEIDION. BLUME.

For Gen. Char. see letter-press to Pl. cclxxii.

1. CLEIDION JAVANICUM, *Bl.*—For description, &c. see Pl. cclxxii.

Generally diœcious as described and figured, but I lately found a tree monœcious.

MACARANGA. PET. THOUARS.

For Gen. Char. see letter-press to Pl. cclxxxvii.

Sec. I. PACHYSTEMON.—*Anthers all 3-celled at the base, 3-valved. Ovary 6-4-celled.*

1. MACARANGA DEPRESSA, *Mull.*—A tree, stipules oblongo-triangular from a broad base reflexed subpersistent, petioles about 4-5 inches long, leaves broadly peltate very unequally 3-5-lobed coriaceo-membranaceous, beneath sparingly waxy glandulose,

the margins glandular, panicles shorter than the leaves, the female with few branches, bracts oblongo-ovate acuminate entire, female calyx 3-lobed, segments rotundate obtuse, ovary 5-4 celled obtusely gibbous depressed resinoso-granular. *DC. Prod.* xv. 989.

Ceylon. I have never seen this species.

Sec. II. MAPPA.—*Anthers 4-valved (very rarely one or two with 3 valves), ovary 2-celled (or occasionally with 3 cells.)*

1. MACARANGA DIGYNA, *Wight.*—A small tree, branches slender, young parts slightly scurfy soon glabrous. Stipules 2-3 lines long linear subulate, leaves 4-6 inches long by 1-2 broad lanceolate, long cuspidato-acuminate, obtuse or slightly cordate at the base and there furnished with 2 glands on the upper side submembranaceous, penniveined, repando-denticulate densely glandulose beneath with minute waxy dots, petioles 1-2 inches long, bracts small acute subulato-bistipulate diœcious, racemes spiciform simple slender generally much shorter than the leaves, (the female sometimes elongated longer than the leaves and bearing a few very small leaves), the male flowers in tiny heads 3-5 together nearly sessile in the axils of the bracts less than ½ a line in diameter, calyx 3-parted glandular, anthers 10-15, filaments glabrous, the female flowers solitary or 2-3 together, calyx 3-4-parted, the segments triangulari-lanceolate acute spreading, ovary 2-lobed densely granuloso-grandular and puberulous more or less echinate, stigmas 2 very long slender acute, subglabrous, capsule 2½ lines in diameter covered with waxy glands and a few sharp black aculei. Claoxylon digynum, *Wight. Icones* 1884. (Stamens too numerous). Rottlera digyna, *Thw.* Mallotus, *DC. Prod.* xv. 1007. Mappa digyna, *Mull. in Linnæa*, 34. 198.

Ceylon, very common about Badagam near Galle, and elsewhere in the plains at the south of the island.

Sec. III. EUMACARANGA.—*Anthers all 4-celled. Ovary 1-celled.*

* *Stamens* (5) 3.

2. MACARANGA TOMENTOSA, *Wight.*—For description, &c. see Pl. cclxxxvii.

3. MACARANGA PELTATA, *Roxb.*—A tree, leaves alternate orbiculari-ovate shortly acuminate peltate entire glabrous above a little tomentose beneath, 6-9 inches long by 4-5 inches broad, stipules obliquely oblong caducous, petioles 1-2 inches long, bracts denticulate. *Male* panicles thin axillary erect interrupted, flowers very minute, bracts 2 lines long rhombeo-ovate or rhombeo-obovate many flowered. Calyx-segments ovate crenate acuminate, stamens 3, filaments free. *Female* racemes axillary simple erect, bracts broad lanceolate 1-2 flowered, calyx as in the male, ovary incurved globular glanduloso-punctate. Osyris peltata, *Roxb. Fl. Ind.* iii. 755. Macaranga, *DC. Prod.* xv. 1010. Macaranga Roxburghii, *Wight Icones tab.* 1949. *fig.* iv. *and t.* 817. M. Wightiana, *Baill. etud. Gen. Euph.* 432.

Mountains on the east side of the presidency. I have never met with it (if distinct from the last.)

4. MACARANGA FLEXUOSA, *Wight.*—A tree, male panicles flexuose, flowers 3-5-androus, bracts at the forks of the panicles foliaceous coarsely serrate rhombeo-ovate acuminate, those at the glomerules glanduliferous triangulari-lanceolato-linear. Male calyx segments orbiculari-elliptic entire. *Wight Icones* 1949, *fig.* 3.

Tinnevelly jungles. I do not know this tree, unless it is, as I suspect, only a variety of M. tomentosa.

Stamens 8-5.

5. MACARANGA INDICA, *Wight.*—A tree, branches glabrous, stipules triangulari-ovate glabrous glaucescent somewhat scariose, petiole about as long as the leaf, leaves densely tomentose when young, 5-6 inches long, orbiculari-ovate acute or very shortly cuspidato-acuminate broadly peltate at the base, subentire or serrated at the margins, in age above glabrous, beneath glaucescent and sometimes subglabrous, glandular with waxy dots, furnished on the upper side near the insertion of the petiole with several large impressed glands, male and female flowers in panicles. Male bracts petioled elliptic covered with a large elliptic shining disk-like gland, female bracts linear-lanceolate without glands, stigma ascending sub-linear acute flexuose, male calyx-segments obovate. Stamens 6-8, filaments monadelphous at the base. Capsule covered with resinous points. *Wight Icones tab.* 1883.

Very common throughout the western forests of this Presidency, also in the Khasya hills.

Analysis, see Pl. cclxxxvii.

1. Male inflorescence.
2. A male flower with 5 stamens.
3. A male flower with 7 stamens.
4. A male flower bud.
5. A stamen, anther 4-celled.
6. Female inflorescence.
7. Female flower opened.
8. Ovary cut vertically 1-celled (the erect ovule is probably a mistake.)
9. Ovary cut transversely. (Drawn from dried specimens.)

HOMONOYA. LOUR.

Gen. Char. Male calyx 3-parted valvate, female 5-parted imbricate, petals and disk none in either sex, stamens very numerous polyadelphous central connate below, crowded and polyandrous at the apex, the central ones sometimes without anthers, anthers 1-celled adnate opening by a short slit, subglobose, rudiment of ovary none. Ovary 3-celled (rarely 4-celled), cells 1-ovuled.

Styles equalling in number the cells of the ovary simple narrow densely papillose shortly connate at the base. Capsule tricoccous, seed ecarunculate smooth spuriously membranaceo-arillate. Shrubs, leaves alternate bistipulate penniveined entire or toothed subcoriaceous, inflorescence axillary often unisexual. Male flowers spiked, females spicately racemose, bracts generally 1-flowered. *Lour. Fl. Cochinch. p.* 637. Spathiostemon, *Bl. Bijd. p.* 621. Lamanaja, *Blanco.* Hæmatospermum, *Wall.* Adelia, *Roxb ;—Wight.*

1. Homonoya riparia, *Lour.*—A large shrub, ramuli pubescent or glabrous, petioles 2-3 lines long, leaves densely lepidote beneath narrow linear-lanceolate acuminate entire or glanduloso-denticulate, 4-6 inches long by 2½-5 lines broad, flower-spikes elongate many flowered, much shorter than the leaves, erect slender. Male calyx about 1 line broad globose puberulous, female calyx scarcely larger, segments ovato-lanceolate persistent, stigmas longer than the capsule, shortly papillose; ovary and capsule occasionally muricate. *Lour. Fl. Cochinch. p.* 637. Croton salicifolius, *Geisel.* Adelia neriifolia, *Roxb. Fl. Ind.* iii. 849 ;—*Wight Icones tab.* 1868. Hæmatospermum Javanense, *Bl.* Hæmastospermum, *Wall.*

Very common in the plains of India, Ceylon and Birmah, in beds of rivers; also in Java ,the Philippines, Cochin China and the Andamans.

Analysis, Pl. XXIV, fig. 1.

1. Male inflorescence.
2. Male flower bud.
3. Male flower.
4. Portion of a column of stamens.
5. A smaller portion very highly magnified.
6. An anther.
7. Female inflorescence.
8, 9. Female flowers.
10. Calyx opened out, a bract visible behind.
11. Ovary cut transversely, 3 cells each 1-ovuled.
12. Ovary cut vertically, ovules pendulous.
13. Magnified style. (Drawn from living specimens.)

2. Homonoya retusa, *Wight.*—A small shrub, leaves alternate sessile or subsessile cuneato-obovate to lanceolato-spathulate crenato-dentate, apex retuse or rounded or truncate, slightly lepidote beneath, 1-1¾ inches long, racemes axillary much shorter than the leaves 2-3 flowered, calyx of the female with the segments ovate, deciduous, stigmas about ½ as long as the capsule papillose. Ovary and capsule smooth. Adelia retusa, *Wight Icones* 1869. Homonoya, *Mull. ;—DC. Prod.* xv. 1022.

Not uncommon in beds of rivers on both sides of the presidency, also in Bombay.

TRIBE HIPPOMANEÆ

TRIGONOSTEMON. Bl.

For Gen. Char. see letter-press to Pl. cclxxiii.

Sec. I. Dimorphocalyx.—*Male calyx shortly 5-toothed, female 5-parted, petals and disk present in both sexes. Stamens in* 3-2 *verticels, anthers introrse.*

1. Trigonostemon Lawianus, *Nimmo.*—For description, &c. see Pl. cclxxiii.

Sec. II. Cheilosopsis.—*Male calyx 5-parted, petals present, disk present in both sexes, stamens in* 3-2 *verticels, anthers extrorse.*

2. Trigonostemon Zeylanicus, *Mull.*—A shrub or small tree, ramuli rather slender terete, the apex together with the very young leaves stellately puberulous, in age glabrous. Stipules 2 lines long linear-lanceolate very caducous, petioles 1-1½ inches long, leaves membranaceo-coriaceous elliptic or nearly linear-lanceolate long-acuminate, glanduloso-serrulate at the margin reticulato-venose, 5-8 inches long by 1-2 inches broad; flowers in simple spicate racemes as long as the leaves, female calyx nearly 2 lines long, the segments orbicular-elliptic tomentose, the 3 outer ones tubercled and thickened at the back above, petals broad ovate glabrous, hypogynous disk urceolate entire glabrous on the outside, the inside and the margin ferrugineo-sericeous. Ovary ovoid a little acute sericeous. Style-branches free to nearly the base. Male flowers and fruit unknown. *DC. Prod.* xv. 1106. Tritaxis zeylanica, *Mull. Arg. in Flora Ratisb.* 1864 *p.* 482.

Ceylon. I have never seen this, and it is not mentioned by Mr. Thwaites.

Sec. Eutrigonostemon.—*Calyx of both sexes* 6-5-*parted, petals and disk present in both sexes, stamens* 3-2 *in a single vertical, anther cells diverging.*

3. Trigonostemon diplopetalus, *Thw.*—A small tree or shrub, young parts and inflorescence sparingly pilose, leaves subglabrous penniveined, 6-9 inches long by 1½-2¾ inches broad, lanceolate mucronate distantly denticulate, cuneate at the base, petioles ½ inch long sulcate above denticulate at the apex. Stipules minute subulate caducous, racemes many-flowered terminal shorter than or rarely equal to the leaves, floriferous from the base, bracts very small triangular ovate fulvo-sericeous. Calyx-segments denticulate, petals glabrous reddish deeply bifid, lobes rounded laciniato-sinuate undulate, glands of the male disk free, connective thick tuberculate, male pedicels 1½-2 lines long, female pedicels thickened above, 4-5 lines long, in fruit 6-7 lines. Style lobes 3 short twice bifid, capsule 3-lobed a little depressed ½ inch broad pilose. *Thw. En. Pl. Zey.* 277 ;—*DC. Prod* xv. 1108.

Ceylon, Palahattoo in the Reigam Corle at no elevation.

4. TRIGONOSTEMON NEMORALIS, *Thw.*—A shrub or small tree, the young angled ramuli, the young leaves and inflorescence sericeo-pubescent soon glabrous, stipules subulate 2-3 lines long subpersistent, petioles 2-3 lines long pubescent bidenticulate at the apex, leaves penniveined subglabrous, 3-6 inches long by 1-1¾ inches broad, lanceolate acuminate mucronulate crenato-denticulate, racemes many flowered shorter than the leaves floriferous from the base, the flowers and pedicels about equal in length, petals 5-6 dull red oblong entire 2-3-times larger than the unequal lobes of the calyx, anthers 3-2, the cells subparallel a little distant at the apex of the rounded connective, female flowers a little larger than the male 6-7 lines in expansion. Ovary hispid. Style-lobes 3 short spathulate emarginate reflexed, capsule nearly ½ inch in diameter muricate pilose of 3 rounded cocci. Seed spherical 3 lines in diameter a little keeled on the back, testa smooth marbled. *Thw. En. Pl. Zey. p.* 277 ;—*DC. Prod.* xv. 1108 ;—*Bedd. Icones Plant. part* x. *Pl.* clxxxiii.

Tinnevelly mountains south of Courtallum, common in the moist forests at 2000-3000 feet elevation (Ayen Covil pass, banks of the Garna river, &c.); Ceylon, central provinces, 2000 feet elevation.

GIVOTIA. GRIFF.

For Gen. Char. see letter-press to Pl. cclxxxv.

1. GIVOTIA ROTTLERIFORMIS, *Griff.*—For description, &c. see Pl. cclxxxv.

OSTODES. BL.

For Gen. Char. see letter-press to Pl. cclxxiv.

Sec. EUOSTODES.—*Anthers introrse.*

1. OSTODES ZEYLANICA, *Thw.*—For description, &c. see Pl. cclxxiv.

CODIÆUM. RUMPH.

Gen. Char. Calyx of both sexes 5-(rarely 3-) parted imbricate, disk present in both sexes, petals alternate with the calycine segments and with the glands of the disk present in both sexes or rudimentary or absent in the female. Stamens central inserted on an elevated receptacle various in number, filaments free or connate in a column, anthers 2-celled, rudiment of ovary none. Ovary cells 1-ovuled. Styles 3-4 equal in number to the cells of the ovary, simple terete connate at the base, or bifid or bipartite. Fruit capsular. Trees or shrubs, leaves opposite or alternate penniveined entire. Flowers monœcious, inflorescence terminal or axillary racemiform or umbellate bisexual or unisexual. *Rumph. Amb. vol.* 4, *p.* 65. Blackia, *Baillon.* Phyllaurea, *Lour. Fl. Cochinch.* Baloghia, *Endlich. Prod. Fl. Norf. p.* 84. Sinospisma, *End. Gen. Plan. n.* 5775. Tylosepalum, *Sulp. Kurz.* Junghuhnia, *Miq. Fl. Ind. Bat.* 1. *part* 2, *p.* 412. Crotonis sp, *L.*

Sec. BLACKIA.—*Male calyx* 4-5-*parted, female* 5-6-*parted. Male petals small. Female petals rudimentary. Stamens* 10-40 *in many series, styles bifid, Flowers monœcious umbelled, disk present in both sexes. Ovary* 3-4-*celled, style branches subulate.*

1. CODIÆUM UMBELLATUM, *Willd.*—A shrub or small tree, branches dichotomously branched, leaves rather rigid membranaceous, 2-6 inches long by 1-2½ inches broad, lanceolato-obovate or elliptico-lanceolate obtusely cuspidato-acuminate, primary veins 7-9 on each side, petioles 2½-6 lines long, flowers in both sexes umbelled, peduncles elongate slender, male pedicels 2½-6 lines long filiform flaccid, female ½-1 inch long, thickened near the apex, male calyx globose 1 line broad, male petals truncato-obovate 3 times shorter than the calyx, stamens 10-15, disk in the male 4-5 glandulose, female calyx larger than the male at length increasing in size and coriaceous, ovary smooth glabrous. Styles slender, female disk urceolate. Croton umbellatum, *Willd. Sp. Pl.* iv. 545 ;—*Wight Icones. tab.* 1874. Blackia umbellata, *Baillon.*

Common in all our Western Ghat moist forests up to 3000 feet, also in Ceylon.

Analysis, Pl. XXIII, fig. 6.

1. Male inflorescence.
2. Male flower buds, sepals imbricate.
3. Full male flower, sepals 4 (sometimes 5), petals 4 (sometimes 5) alternate with the sepals, disk of 4 (5) large glands, opposite the sepals. Stamens 16 central, pluriserial.
4, 5. Anther, front and back view.
6. Female inflorescence.
7, 8. Female flowers, calyx 5-(6-) parted imbricate, disk urceolate, styles 3 bifid subulate connate at the base.
9. Ovary cut vertically, ovules pendulous.
10. Ovary cut transversely, cells 3 each 1-ovuled.
11. A valve of the capsule.
12. The seed, shewing its caruncle.

CHÆTOCARPUS. THW.

For Gen. Char. see letter-press to Pl. cclxxxiv.

1. CHÆTOCARPUS CASTANOCARPUS, *Roxb.*—For description, &c. see Pl. cclxxxiv.

2. CHÆTOCARPUS CORIACEUS, *Thw.*—A middling sized tree, ramuli subglabrous, leaves very coriaceous glabrous oblong shortly acuminate smooth above, sparingly venose beneath, acute at the base, 3-6 inches long by 1½-3 inches wide, petioles 3-5 lines long, fascicles many flowered minutely tomentose, flowers 1-1½ lines long, filaments pilose. Capsule ovoid obscurely trigonous apiculate muricate sparingly strigose, 8 lines long, putamen bony. *Thw. En. Pl. Zey. p.* 275.

Ceylon, in the Ratnapoora and Ambagamwa districts, very similar to No. 1, but the leaves are much more coriaceous and the capsule very different. The timber is hard and in use for building purposes. For drawing of the fruit and its analysis see Pl. cclxxxiv.

GELONIUM. ROXB.

Gen. Char. The calyx-segments imbricate often unequal, in both male and female, petals none, disk in the male extra-staminal (often suppressed), stamens generally numerous (rarely only 6) occupying the centre of an elevated disk which is sometimes furnished with glands, filaments free, anthers 2-celled introrse, the cells adnate nearly their whole length, rudiment of ovary none. Disk in the female urceolate. Staminodes sometimes present, ovary 3-2-(rarely 4-) celled, cells 1-ovuled. Stigmas sessile 3-2 fid, fruit carnoso-capsular of 3-2 cocci. Small trees or shrubs, glabrous, leaves alternate (or rarely opposite) bistipulate penniveined entire or dentate, flowers diœcious (rarely monœcious) fasciculate, fascicles leaf opposed (or in the opposite-leaved species axillary). *Roxb. Fl. Ind.* iii. 829. Suregada, *Roxb.* Erythrocarpus, *Bl. Bijd. p.* 604. Ceratophorus, *Sond. in Linnœa vol.* xxiii. 120.

1. GELONIUM LANCEOLATUM, *Willd.*—A small tree, branches terete, leaves alternate oblong ovate or obovate or elliptic-lanceolate entire or with a few teeth towards the apex smooth shining firm, ¾-8 inches long by ½-3 inches broad, petioles 1-3 lines long, stipules early deciduous and leaving prominent circular scars, flowers in short leaf-opposed fascicles sometimes subracemose often gummy, flowers yellow fragrant. Male, calyx 5-leaved slightly puberulous, stamens 17-60, receptacle more or less glandular, glands sometimes 3-lobed, filaments as long as the calyx, female, calyx 5-6 leaved, ovary 3-celled, stigmas flat bifid, the arms entire or crenate or much cleft or lobed. Capsule fleshy yellow smooth 3-valved 3-celled. *Roxb. Fl. Ind.* iii. 831. G. multiflorum, *Adr. Juss. Tent. Euph.* iii. *t.* 10. *fig.* 31-*A*. G. fasciculatum, *Roxb. Fl. Ind.* iii. 832. Suregada multiflora, *Baill. etud. Gen. Euph.* 396. G. multiflorum, lanceolatum, and angustifolium, *DC. Prod.* xv. 1127-8.

Not uncommon throughout our eastern mountains, generally on the banks of streams.

Analysis, Pl. XXII, fig. 6.

1. Branch of a male tree in flower.
2. A male flower bud, sepals 5 imbricate, no petals, anthers about 30 erect in the bud.
3. Male flower fully expanded, stamens only 17.
4. Anther, front view.
5. Anther, back view.
6. A fascicle of female flowers.
7. A fruit.
8. A female flower, stamens 3 each 2-cleft.
9. The same, the 5-parted imbricate calyx open to expose the ovary.
10. Ovary cut vertically.
11. Ovary cut transversely 3 cells, each 1-ovuled. (The male from dried specimens, the female copied from Wight's figure.)

EXCÆCARIA. LINN.

Gen. Char. Calyx-segments 3-2 sometimes subobsolete in the male, imbricate in both sexes, petals and disk none in either sex. Stamens 3-2 central, filaments free or shortly connate at the base or connate their whole length in a column, anthers 2-celled, cells adnate lengthways, no rudiment of ovary, ovary (4)-3-2 celled, cells 1-ovuled. Styles (4-) 3-2-simple, connate below, stigmatose on the inside, fruit a capsule furnished with a central column, sometimes fleshy at first but splitting at maturity, seed carunculate, embryo vertical, cotyledons broad. Trees or shrubs often furnished with a blinding milky juice, leaves simple generally alternate rarely opposite bistipulate, flowers monœcious or rarely diœcious in axillary or terminal spikes. *Linn. Gen. Pl.* Sapium, *Jacq* Triadica, *Lour.* Commia, *Lour.* Stillingia, *Ad. Juss.* Falconeria, *Royle.* Bonania, *A. Rich.* Spirostachys, *Sond in Linnœa.* Sclerocroton, *Hockst.* Sapiopsis, *Mull. Arg. in Linnœa.* Sillingfleetia, *Boj. Hort. Maurit.* Gymnobothrys, *Wall.*

Sec. FALCONERIA.—*Male calyx bifid, female 2-3-fid, fruit baccate at first but bursting at maturity, seed spuriously arillate.* (Genus Falconeria, *Royle*; Gymnobothrys, *Wall.*)

1. EXCÆCARIA INSIGNIS, *Royle.*—A good sized tree, very milky, glabrous, ramuli thick rigid, leaves elliptic acuminate or cuspidate membranaceous serrated reticulato-venose beneath, 4-8 inches long by 1½-3½ broad, petioles 1-2 inches long biglandular at the apex. Spikes unisexual densely flowered, bracts very small, female 1-flowered, male many-flowered, male flowers small, segments of the male calyx crenato-denticulate or entire, ovary 2-3 celled. Capsule 3 lines long by 2 wide ovoid, 2-3 lobed smooth. Falconeria insignis, *Royle. Illus. Bot. Himal. p.* 354. F. Wallichiana, *Royle, l. c.* F. Malabarica, *Wight Icones tab.* 1866.

Not uncommon in subalpine tracts on both sides of the Presidency; on the Kurnool hills (Nallay Mallays) called Garpa Shola; also in Ceylon, Bombay and Bengal; the milky juice is very poisonous.

Analysis.

1. Portion of a male spike.
2. Male flowers, sepals 2, stamens 2.
3. Portion of a female spike.
4, 5 Female flowers.
6. Ovary cut vertically.
7. Ovary cut transversely.

Sec SCLEROCROTON.—*Male calyx 3-parted, segments ovate or lanceolate connate at the base or free, capsule generally dry, seed not spuriously arillate.*

* *Female calyx without glands inside.*

2. EXCÆCARIA COCHINCHINENSIS, *Lour.*—A small tree or shrub, leaves opposite obovato-lanceolate acuminate at both ends crenato-serrate, 3 5 inches long by ¾-1½ broad, petioles 3-5 lines long without glands, stipules narrow lanceolate, bracts broad ovate acuminate with 2 small inflexed glands at the base, all 1-flowered. Male calyx subsessile 3 parted, the segments in both sexes dentate oblongo-ovate acuminate. Stamens 3, female flowers shortly pedicelled, styles equalling the ovary. *Lour. Fl. Cochinch vol.* ii 750. E. crenulata, *Wight Icones. tab.* 1865. Similar to E. oppositifolia, but the spikes laxly flowered and the bracts much shorter.

Very common in our western forests up to 5000 feet elevation, also in Ceylon and Cochin China.

Analysis, Pl. XXII, fig. 5.

1. Portion of a male spike magnified.
2. The same more advanced, highly magnified.
3. Male flowers with their bracts, anthers erect in the bud.
4. A male flower, sepals 3 imbricate and stamens 3.
5. Anther back view.
6. Female flowers, calyx, ovary, and 3 styles, no staminodes.
7. Ovary cut vertically, ovules pendulous.
8. Ovary cut transversely, 3 cells, each 1 ovuled.

* * *Female calyx with teeth-like glands at the base inside.*

3. EXCÆCARIA INDICA, *Willd.*—A small tree, leaves penniveined alternate membranaceous lanceolate acuminate at the apex acute at the base serrated, obscurely 2-4 glandulose on the margins at the base, rather shining above, opaque beneath, 1½-4½ inches long, by 5-10 lines broad, petioles 3-5 lines long without glands, stipules ovato-lanceolate, spikes amentiform terminal solitary about equalling the smaller leaves, bracts triangulari-ovate acute puberulous supported by 2 fleshy glands, the male many-flowered pedicelled, pedicels pilose, the female on pedicels 1-2 lines long, the calyx-segments in both sexes lacerated, the female with many teeth-like glands inside at the base Stamens 3, ovary 3-2-celled, style long slender, 3-4-times as long as the ovary, connate below into a column. Capsule globose about 1 inch in diameter woody scarcely 3-lobed, seeds oblong 5 lines long smooth Sapium Indicum, *Willd. Sp. Pl.* iv. 572;—*Roxb. Fl. Ind.* iii. 692;—*Wight. Icones tab.* 1950. Excæcaria Indica, *DC. Prod.* xv. 1216. Sapium Hurmais, *Hochst.* Stillingia Indica, *Baillon.*

Ceylon, warmer parts of the island, called Kirri-makulu; also in Bengal and in Africa, and in Malabar if Rheede's figure *Hort. Mal.* iv. *t.* 51 is correctly quoted; the juice of the tree is very poisonous and the seeds are used to poison fish.

Sec. EUEXCÆCARIA.—*Male calyx reduced to 3-2-1, subulato-acuminate often somewhat unequal, small segments. Capsule dry, seed not spuriously arillate. Similar to the preceding section, except that the calycine segments are more reduced and subulate.*

4. EXCÆCARIA OPPOSITIFOLIA, *Jack*—A small tree, stipules broadly ovate from the base subscariose subulate acuminate 4-7 lines long, leaves opposite elliptico-lanceolate acuminate, crenato-dentate firm shining above, 4-6½ inches long by 1½-2½ inches broad, petioles about ½ an inch long without glands, male spikes 2½ 3½ inches long forming cylindric aments, densely flowered from the base to the apex, bracts imbricate oblongo-ovate rigid thick calloso-mucronate with the glands small and smooth. Male calyxes subsessile bibracteolate. Segments quite free from the base narrow-ovate lacerate, female flowers and fruit not seen. *Jack. in Calc. Journ. of Nat. Hist.* iv. 386;—*DC. Prod.* xv. 1219. Stillingia, *Baillon.*

Malabar and Mysore, also on the Bombay ghats. Very like Ex. Cochinchinensis, but differing in its more densely flowered ament-like spikes and in its longer bracts; perhaps not distinct as a species.

5. EXCÆCARIA AGALLOCHA, *Linn.*—A small sea-coast tree, leaves alternate ovate or elliptic, smooth on both sides, remotely and slightly serrate or entire, with 2 glands at the base on the margin, 2-3 inches long by 1-1¾ inch broad, petioles about an inch long, smooth without glands. Stipules small subulate, spikes axillary solitary or several together, bracts 1-flowered. *Male* amentiform cylindric densely flowered 1½-3 inches long; *female* 2-3 times shorter than the male and in different axils, bracts densely imbricate broad short truncate without separate glands but glandulosely thickened. Male calyx sessile bibracteolate, the segments linear-lanceolate lacerate, female-calyx with the segments ovate acuminate and a little shorter than the pedicels furnished inside with a gland on each side at the base. Stamens 3, anthers at length much exserted, styles 3 recurved equalling the ovary shortly connate at the base. Capsule 3-lobed, seed subglobose. *L. Sp. Pl. p.* 1451;—*Roxb. Fl. Ind.* iii. 756. Commia Cochinchinensis, *Lour. Fl. Cochinch.* Stillingia, *Baillon.*

A common tree in salt backwaters throughout the presidency, and in Ceylon (called Tella-kiriya) and Bengal, &c. Also in the Philippines, Timor, Java, Cochin China, New Caledonia and Australia; the milky juice is very poisonous and blinding, and produces inflammation and ulceration; the wood is only used for fuel and charcoal.

TRIBE EUPHORBIEÆ.

EUPHORBIA. L.

Gen. Char. Flower-heads resembling single flowers. Involucre calyx-like, cup-shaped, with 4 or 5 minute teeth, alternating with as many horizontal glands, which are sometimes expanded into petal-like appendages. Within are 10 to 15 male flowers, consisting each of a single stamen with an articulated filament, and a single female flower in the centre, reduced to a stipitate 3-celled ovary protruding from the involucre, with one pendulous ovule in each cell. Style 3-cleft, the branches (or distinct styles) entire or 2-lobed. Capsule separating into three 2-valved cocci. Herbs, shrubs or trees, abounding in milky juice. Stem-leaves alternate, without stipules, the flowering-branches umbellate dichotomous, with usually opposite leaves, or all the leaves opposite and often stipulate; or succulent leafless shrubs.

The species of this genera scarcely deserve a place in this work. Species 1 to 6 are Cactus like thorny shrubs or small trees with fleshy branches, and are in use as hedge plants; No. 7 is the common species so well known as the milk-hedge, with pipe-like fleshy unarmed branches.

1. EUPHORBIA NERIIFOLIA, *Linn.*—A small tree, branches obsoletely 5-angled, prickles stipularly twin short diverging black, leaves subsessile obovato-oblong obtuse mucronulate, about 3-6 (or even 12) inches long, cymes sessile or subsessile in the upper axils, 1-3 headed rarely dichotomously several headed, the leaflets under the involucre ovate membranaceous, involucre hemispherical, lobes large ovate fimbriated at the margin, glands transversely ovate. Styles united up to the middle, capitate and entire at the apex, capsule sharply trigonal. *L. Hort. Cliff. p.* 196;—*DC. Prod.* xv. 79. E. ligularia, *Roxb. Fl. Ind.* ii. 465.

A small tree, 20 feet high, with a trunk up to 3 feet in girth, abounding with a milky acrid juice; the plant is sacred to the goddess of serpents.

2. EUPHORBIA NIVULIA, *Ham.*—A small tree or large shrub, branches round somewhat verticellate, prickles stipulary short divaricate, leaves near the apex of the branches tongue-shaped mucronate fleshy, 4-6 inches long by 1½-2 broad near the apex, whence they taper towards the base smooth shining glabrous. Cymes axillary short peduncled 3-headed, involucre hemispherical, the lobes broad truncate denticulate, styles united to the middle scarcely thickened at the apex. *Ham. Linn. Trans.* xiv. 286;—*Wight Icones tab.* 1862. E. neriifolia, *Roxb. Fl. Ind.* ii. 467.

Common on arid rocky hills about Coimbatore, Madura and other parts of the presidency, east and west sides.

3. EUPHORBIA ANTIQUORUM, *Linn.*—A shrub or small tree, erect ramous, leaves (rarely present) obovato-spathulate, branches 3-4-or more-angled, furnished with numerous protuberances each armed with 2 short spreading stipulary thorns; joints straight, peduncles solitary or in pairs 3-1 headed a little above the axils of the stipules, the floral leaves ovate shorter than the involucre lacerated, involucre hemispherical, the lobes connivent ovate fimbriate. Capsule deeply trisulcate. *Linn. Hort. Cliff. p.* 196;—*Wight Icones tab.* 897.

Common throughout India and in Ceylon, called in Ceylon Dalook.

Analysis, Pl. XXII, fig. 4.

1. A cyme with 3 heads of flowers.
2. A head of flowers (resembling a single flower.)
3. A head of flowers cut through vertically, one female flower (nothing but a stipitate 3-celled ovary) in the centre and several male flowers (nothing but single stamens each with an articulated filament) round it.

4, 5, 6. Male flowers with the petal-like glands.

7. Capsule cut transversely 3-celled, cells 1-ovuled. (Copied from Wight's *Icones.*)

4. EUPHORBIA TORTILIS, *Rottler.*—A small tree or large shrub, stems erect ramous jointed; joints spirally twisted angular, angles furnished with armed protuberances, cymes fascicled in the sinuses between the angles, each shortly pedunculate and 3-headed. *Wight Icones tab.* 898.

Common in this presidency and in Ceylon; differs from the last in its twisted joints; called in Ceylon Seenook.

5. EUPHORBIA TRIGONA, *Roxb.*—A small tree or shrub, erect 3-sided with prominent repand angles, stipulary spines 2 or sometimes 4, leaves deciduous obovate cuneate, cymes above the axils 3-headed, the middle one nearly sessile sterile, the lateral ones fertile pedicelled. *Roxb. Fl. Ind.* ii. 468;—*Wight Icones* 898.

Coimbatore, on low arid hills.

6. EUPHORBIA CATTIMANDOO, *Elliott.*—Shrub or small tree, erect 5-sided with prominent repand angles; stipulary thorns paired short subulate, leaves sessile succulent deciduous obovate subcuneate cuspidate glabrous; cymes crowded 3 headed, the middle one usually sterile and the lateral ones fertile, sometimes the reverse. *Wight Icones tab.* 1993.

Vizagapatam district, very common, flowering from March till May; called in Teligu Cattimandoo. This plant yields a substance something like gutta-percha; the milk is boiled and sold in cakes or cylinders, and when heated again can be used as a cement and as an outward application in cases of rheumatism.

The above 6 species belong to DeCandolle's Section Diacanthium and are all armed with twin spines, and I have a 7th species of this section, a small tree on the Anamallays 3-4000 feet elevation, with very compressed stems, but it is not perfect enough for description ; the next species belongs to the Section Tirucalli and is unarmed.

7. EUPHORBIA TIRUCALLI, *Linn.*—An erect unarmed succulent small tree, branches cylindrical scattered or clustered very divergent, of a bright shining green, leaves very few and small linear oblong or wanting, flower-heads clustered on very short pedicels in the forks of some of the smaller branches, glands of the involucre peltate, capsule hairy size of a large pea. Styles 2-lobed. *Roxb. Fl. Ind.* ii. 470.

A common hedge plant all over India and in the Archipelago, called Tirucalli in Tamil and Lanka Sij in Bengal ; well known by the name of milk-hedge ; full grown trees 3 feet in girth ; the wood is white, close grained, and rather hard.

GENERA ALLIED TO EUPHORBIACEÆ.

DAPHNIPHYLLUM. BLUME.

For Gen. Char. see letter-press to Pl. cclxxxviii.

This genus is generally referred to Euphorbiaceæ, or as allied to that order DeCandolle makes a separate order for it, *i. e.*, *Daphniphyllaceæ*, which he places between Euphorbiaceæ and Buxaceæ, (which two orders are now generally amalgamated,) and he considers it well separated from them by its small embryo in the apex of the albumen.

1. DAPHNIPHYLLUM GLAUCESCENS, *Bl. Bijdr. p.* 1153.—For description, &c. see Pl. cclxxxviii. (under the name of D. Roxburghii, *Baillon*, which should be altered as above, as Blume's is the older name.)

SARCOCOCCA. LINDLEY.

Gen. Char. Calyx imbricate in both sexes, 4-parted in the male 4-6 parted in the female, petals and disk none. Stamens as many as the calyx segments and opposite to them, inserted round the small rudiment of an ovary, filaments free stout, anthers fixed a little above the base, the cells adnate in their whole length to the connective which is slightly produced and apiculate, rudiment of ovary 4-lobed. Ovary 2-3 celled, cells 2-ovuled, styles as many as the cells entire or bilobed, fruit subbaccate not opening, seed albuminous arillate, cotyledons broad ovate fleshy compressed, radicle superior shorter than the cotyledons. Evergreen shrubs, branches terete, leaves simple alternate exstipulate 3-nerved or penniveined entire, inflorescence axillary racemiform many-flowered, the female flowers below the male. *Lindley in Bot. Reg. t.* 1012 ;—*DC. Prod.* xvi. 2. (under Buxaceæ). Lepidopelma, *Klotzsch.*

1. SARCOCOCCA SALIGNA, *Don.*—A large shrub, leaves very glabrous and shining lanceolate to nearly orbicular 3-nerved cuspidately acuminate, membranaceous to subcoriaceous, generally 3-4½ inches long by 1½ broad but very variable in size, inflorescence generally very much shorter than the leaves, male peduncles 2-4-bracteolate or without bracteoles, styles more or less recurved. Buxus saligna, *Don. Prod. Fl. Nep. p.* 63 (1825). Sarcococca pruniformis, *Lindl. Bot. Reg.* xii. 1012. S. trinervia, *Wight Icones* 1877. Buxus coriaceus, *Spreng.* S. salicifolia, *Baillon.* S. saligna and Zeylanica, *DC. Prod.* xvi. *p.* 11 and 12.

Very common at the higher elevations on our western mountains (Ootacamund, &c.) but I have also found it in the plains, South Canara and Malabar ; the wood is something like Box-wood, but it is very small.

Analysis, Pl. XXIV, fig. 5.

1. Portion of a branch in flower, male flowers above numerous, female below.
2. A male flower, sepals 4 decussately opposite and imbricate.
3. A male flower open, shewing the 4 stamens (opposite the calycine segments) inserted round the 4-lobed rudiment of an ovary, no petals or disk.
4. Anther, back view.
5. Anther, front view.
6. The 4-lobed abortive ovary.
7. A female flower and bract.
8. A single bract.
9. Vertical section of the ovary, ovules pendulous.
10. Transverse section, cells 2-ovuled. (All drawn from living specimens.)

11 to 15. Fruit, seed and embryo, copied from Wight's *Icones*.

ORDER LXX.—URTICEÆ.

Flowers unisexual or rarely polygamous, usually in cymes or heads, not in catkins. Perianth calyx-like, of 1 to 5 divisions. Stamens as many as perianth-segments, and opposite to them, rarely reduced to fewer or one. Anthers 2 celled. Ovary free or rarely adherent, 1-celled, with 1 ovule, rarely 2-celled, with 2 ovules, of which 1 only comes to perfection. Style usually short or none with 1 or 2 long or short stigmas. Fruit a 1-seeded indehiscent drupe, or winged samara, or small seed-like nut. Albumen fleshy or none. Radicle superior. Trees, shrubs, herbs, or climbers, furnished with stipules. Foliage and inflorescence very various. A scabrous surface and a milky juice or acrid or stinging secretions are very common.

This order, which now includes the Celtideæ, Ulmaceæ (Elmworts), and the Artocarpeæ and Moraceæ of old authors, is a very large one, and of considerable importance to the forester. The Celtideæ are all trees and 3 of the 4 genera yield valuable timber, and they are found all

over the presidency except Gironniera, which is confined to the western forests and Ceylon. In Artocarpeæ, Artocarpus, Antiaris, Allœanthus, Ficus, and Streblus, yield large trees, and Artocarpus affords splendid timber, especially for furniture and ship-building. Ficus abounds in species, but they all yield only very inferior timbers. Allœanthus is, I believe, confined to Ceylon, and Antiaris (the largest tree in S. India) and Cudranus, to our western forests and Ceylon; but the others are found throughout the presidency. Cudranus, Plecospermum and Taxotrophis are straggling or scandent shrubs only. The Euticeæ only give small weak trees or shrubs.

Styles or stigmas 2 equal. Trees, flowers cymose polygamous or diœcious, filaments nearly erect in the bud. Celtideæ.
- Flowers polygamous, the fertile ones hermathrodite.
  - Fruit winged all round ... ... ULMUS.
  - Fruit not winged.
    - Velvetty or hirsute trees, stamens exserted, stigma short plumose ... SPONIA.
    - Glabrous-leaved trees, stamens included, stigma linear ... ... CELTIS.
    - Glabrous-leaved trees, stigmas long subulate .. .. GIRONNIERA.

Style generally simple rarely 2-lobed. The flowers of one or both sexes, closely packed on a globose or cylindric generally succulent receptacle (except in Taxotrophis.) Artocarpeæ.
- Unarmed.
  - Monœcious, male and female flowers on different globular or cylindric fleshy receptacles ... ... ARTOCARPUS.
  - Monœcious, male flowers outside a flat fleshy receptacle, female flowers solitary axillary ... ... ANTIARIS.
  - Monœcious, male and female flowers together inside a glabrous or pear-shaped fleshy receptacle... .. .. FICUS.
  - Diœcious, male flowers densely packed on a cylindric unilateral receptacle, female on a globular receptacle .. .. .. ALLÆANTHUS.
  - Diœcious or monœcious, male flowers capitate but rather lax on a globular receptacle, female solitary or subsolitary in the axils ... STREBLUS.
- Armed.
  - Diœcious, male and female flowers in dense globular fleshy heads ... CUDRANUS.
  - Diœcious, male flowers in globular heads, female immersed in a succulent ovoid receptacle ... ... PLECOSPERMUM.
  - Diœcious, male flowers in small heads or spicate, female flowers solitary or racemose .. .. TAXOTROPHIS.

Style or stigma simple, flowers distinct in cymes, clusters, heads or spikes. Eurticeæ.
- Stigma filiform.
  - Female perianth enclosing the ovary... ... ... BOHMERIA.
  - Female perianth not enclosing the ovary ... ... LAPORTEA.
- Stigma short.
  - Leaves snowy-white beneath, fruit baccate ... ... MOROCARPUS.
  - Leaves not white beneath, fruit dry ... ... ORKOCNIDE.

ULMUS. LINN.

For Gen. Char. see letter-press to Pl. cccx.

1. ULMUS INTEGRIFOLIA, *Roxb.*—For description, &c, see Pl. cccx.

CELTIS. TOURN.

For Gen. Char. see letter-press to Pl. cccxii.

1. CELTIS ROXBURGHII, *Planch.*—For description, &c. see Pl. cccxii.

Under the name of C. trinervia, *Roxb.*, which should be altered as above, Roxburgh's name being a synonym, as that specific name is occupied by another species.

2. CELTIS SEROTINA, *Planchon.*—A very large handsome tree, young parts aureo strigose, leaves obliquely ovate with a along fine acumination, serrated from the apex to below the middle 3-nerved, glabrous in age, 1½-3 inches long by ¾-1¼ broad, petioles 3-5 lines long, inflorescence axillary or from the old axils; fructiferous pedicels usually 3 together, one free the other 2 united at the base, berry nearly oval glabrous. *Planch. Ann. Sc. Nat.* 3. *Ser.* x. 262;—*Wight. Ic.* 1970.

This handsome tree is very common in the Wynaad at 2500 feet elevation, and abundant on the Nilgiris at 5000-6000 feet, where it is well known as the Nilgiri elm, flowering in February and March with the young leaves.

For Analysis, see Pl. cccxii.

3. CELTIS WIGHTII, *Planchon.*—A small tree, young parts strigose, leaves oblongo-ovate to lanceolate very hard and coriaceous, 3-nerved glabrous on both sides, entire, 2-5 inches long by 1-2½ broad, petioles 3 9 lines long, stipules somewhat peltate. Cymes polygamous (male and hermathrodite) as long or twice as long as the petioles, fruit ovate smooth shortly rostrate. *Planchon l. c.* 307;—*Wight Icones. tab.* 1969.

Common in subalpine tracts on both sides of the presidency and in Ceylon, called in the Circars Tellá káká mushti; wood exceedingly hard.

4. CELTIS DYSODOXYLON, *Thw.*—A middling sized tree, the young parts ferrugineo-pilose, leaves entire or rarely obscurely sinuato-dentate ovate more or less abruptly acuminate firm 3-nerved, a little oblique and narrowed at the base, glabrous above and intensely green, paler beneath and the costa and veins puberulous, 2½-3½ inches long by 1¼-2 inches broad, petiole 1½-3 lines long, cymes short few-flowered ferrugineo-pilose, flowers 5-merous densely pilose at the base inside, ovary ferrugineo-strigose towards the apex. Stigmas elongate acute, drupe small subspherical a little acuminate. *Thw. En. Pl. Zey. p.* 267.

Ceylon, central provinces up to 5000 feet elevation, called Gooranda ; the freshly cut wood has a strong and disgusting odour.

SPONIA. COMM.

For Gen. Char. see letter-press to Pl. cccxi.

1. SPONIA WIGHTII, *Planch.*—For description, &c. see Pl. cccxi.

2. SPONIA VELUTINA, *Planch.*—A middling sized tree, branchlets and leaves softly velvetty, the clothing on the very young parts shining, leaves ovate oblong cuspidately acuminate slightly unequal at the base, cordate or rounded serrated on the margin above beset with rough points, about 4 inches long by 1½ broad, petioles 3-4 lines long, cymes (male female and polygamous) short peduncled or subsessile equalling or twice as long as the petioles, many flowered. Male flowers hairy outside, berries ovate glabrous or sometimes with a few hairs. *Planchon. Ann. des Sci. Nat. 3rd Ser.* x. 264 ;—*Wight Icones*, 1990.

Widely distributed throughout India. This is closely allied to No. 1, but that is generally (as far as I have observed always) diæcious, and in this male and female and polygamous flowers are mixed in the same axil.

3. SPONIA ORIENTALIS, *Planch.*—The Ceylon Sponia is kept distinct from our Indian species by Planchon under this name, but I do not know how it differs from No. 1 except in having rather longer male cymes.

GIRONNIERA. GAUDICH.

For Gen. Char. see letter-press to Pl. cccxiii.

1. GIRONNIERA RETICULATA, *Thw.*—For description, &c. see Pl. cccxiii.

2. GIRONNIERA SUBÆQUALIS, *Planch.*—A good sized tree, 40 feet, young parts, petioles and veins on the underside of the leaf adpressedly pilose, leaves a little rough oblong or elliptic or oblongo-elliptic acuminate a little unequal at the base, crenated towards the apex or subentire, 2½-6½ inches long by 1-3 inches broad, petioles 2-4 lines long, female flowers axillary solitary or several together separately or on a short raceme. *Planchon. Ann. des Sci. Nat. Ser.* iii. *vol.* x. *p.* 339. Helminthospermum scabridum, *Thw. in Hook. Journ. of Bot.* vi. 302. *t.* 9. *c.*

Ceylon, central provinces, up to 4000 feet elevation.

For Analysis, see Pl. cccxiii.

ARTOCARPUS. LINN.

For Gen. Char. see letter-press to Pl. cccviii.

1. ARTOCARPUS HIRSUTA, *Lam.*—For description, &c. see Pl. cccviii.

2. ARTOCARPUS NOBILIS, *Thw.*—For description, &c. see Pl. cccix.

3. ARTOCARPUS INTEGRIFOLIA, *Willd.*—A large timber tree, young branches hirsute, leaves alternate oval to ovate-oblong lobate in saplings, coriaceous glabrous and shining above, a little hirsute beneath, 4-12 inches long (or much larger in saplings), petioles 4-12 lines long, stipules twin broad-lanceolate nearly glabrous sheathing soon deciduous. *Male* ament short peduncled as large or a little larger than a man's thumb, cylindric mixed with the female on the boughs or trunk or even from the root, densely covered with small sessile flowers : calyx or perianth 2-leaved, segments wedge-formed equal a little hairy, filament thick club-shaped a little longer than the calyx. *Female* ament oblong densely covered with small sessile ovaries perforated at the apex for the style, ovaries 4-6 angled at the apex and solid throughout except at the base where the cell is lodged. Style much protruded, stigma recurved grooved on the outside, fruit oblong murexed up to about 3 feet long by 1 foot wide, and weighing 10 to 60 lbs. Seed reniform as long as a nutmeg. *Willd.* ;—*Roxb. Fl. Ind.* iii. 522 ;—*Wight Icones tab.* 678.

Found throughout our western mountain forests up to 4000 feet elevation, and also much cultivated throughout India and Ceylon. Called in English the jack tree (a corruption of the Sanscrit name), in Tamil Pilla, and in Teligu Panasa ; the timber is excellent and much in use for furniture and house building ; it is at first yellow fading to brown, hard and brittle, resembling Satin and apt to warp if not properly seasoned ; a cubic foot unseasoned weighs 50 lbs. and 44 when seasoned, and its specific gravity is ·706. The fruit is a favorite article of food with the natives, and the seeds are roasted and eaten ; the tenacious white juice makes a good bird-lime.

4. ARTOCARPUS LAKOOCHA, *Roxb.*—A very large tree, young shoots downy, leaves alternate about the apex of the branches oblongo-ovate, oval, ovate or even somewhat cordate acute or with a longish fine acumination, margin entire, glabrous above beneath

densely downy and whitish, primary veins much raised and prominent beneath and veinlets beautifully reticulated, 6-12 inches long by 2-6 inches broad, petioles ½-1 inch long. Stipules small caducous, aments axillary the male generally in the lower axils, the female in the upper. *Male* aments subsessile irregularly roundish, size of a nutmeg. Calyx 3-4 leaved. *Female* short peduncled globular, fruit minutely velvetty about as large as a man's fist, generally of an irregular roundish form, yellow when ripe, seeds oblong. *Roxb. Fl. Ind.* iii. 524 ;—*Wight. Icones* 681.

Common in South Canara, Coorg and Malabar, from the plains up to 3000 feet, also on the Bombay ghats, and in Ceylon ; called Woti huli in South Canara.

var. β.—leaves glabrous on both sides, elliptic acute and unequal sided at the base. Ceylon, south and central parts of the island. Artocarpus Gomiziana, *Wall Trecul. Ann. Sc. Nat. 3rd Ser.* vii. 118. I only have this glabrous variety from Ceylon.

5. ARTOCARPUS INCISA, the Bread-fruit tree, is common in a cultivated state on the western side of this presidency and in Ceylon, but it is not indigenous.

CUDRANUS. RUMPHIUS.

Gen. Char. Flowers diœcious, both sexes densely crowded in globular peduncled axillary heads, bracteoles numerous, 2-3-4, incurved at the apex and alternate with the calycine segments, male calyx 4-parted or 4 sepals, the sepals spathulato-oblong concave imbricate in 2 series in the bud. Stamens 4, filaments ⅔rds the length of the sepals and opposite to them and often cohering with them at the very base, anthers oblong 2-celled, cells opposite dehiscing longitudinally, rudiment of pistil subulate acute. *Female* calyx 3-4 sepaled, sepals imbricate spathulato-oblong concave obtuse, ovary free 1-celled 1-ovuled. Style simple, stigma filiform, ovule pendulous from the apex of the cell campylotropal. Achenia 1-seeded included with the fleshy calyxes in the globose receptacle: seed inverse, testa crustaceous, embryo in the axil of fleshy albumen, cotyledons unequal foliaceous the margin convolute and somewhat folded round the radicle, radicle long curved ascending. Scandent thorny shrubs, leaves alternate petioled entire penniveined, stipules twin axillary, peduncles simple axillary solitary or twin. *Rumphius Amboin.* v. *p.* 22, *tt.* 15, 16. Cudranus and Maclura (Sec. Plecospermum), *Miquel.* Cudrania, *Trecul. Ann. Sc. Nat.* 3. *Ser.* viii. 122. Maclura (Sec. Leptosura), *Blume. Mus. Bot.* ii. 83. Trophis, *Willd. in part.*

1. CUDRANUS RUMPHII, *Thw.*—A scandent shrub, young ramuli pubescent or glabrous, spines axillary recurved 3-4 lines long, leaves glabrous elliptic or ovate or obovate acute or acuminate and mucronate rarely obtuse entire, 1½-4 inches long by 1-1½ broad, petioles 2-6 lines long. *Thw. En. Pl. Zey. p.* 262. C. Birmanus, Javanus, Javanensis, and Amboinensis, *Rumph. l. c.* C. Amboinensis, *Miq. Fl. Ind. Bat.* i. 290. Cudrania Javanensis, *Trec. l. c.* (not *Wight Icones* 1961). Maclura Javanica, *Miq. l. c.* 280. Maclura Javanica, Timorensis and Amboinensis, *Bl. Mus. Bot.* 83, 84. *tab* 31. Plecospermum cuneifolium, *Thw. in Hook. Journ. Bot.* vi. 303. Trophis spinosa, *Willd. Sp. Pl.* iv. 734, *in part* (not *Roxb.*)

Ceylon, hot dry parts of the island.

Analysis, Pl. XXVII, fig. 1.

1. Portion of a branch of male plant in flower.
2. A head of male flowers, vertical section.
3. A male flower bud.
4. A male flower open.
5. A sepal and stamens.
6, 7. Anthers, front and back view.
8. Portion of female plant in flower.
9. A head of female flowers.
10. The same, vertical section.
11. 3-sepaled female flower.
12. A 4-sepaled female flower.
13. Ovary cut vertically, shewing the solitary pendulous ovules. (Partly from Blume's drawing, partly from dried Ceylon specimens)

PLECOSPERMUM. TRECUL.

Gen. Char. Flowers diœcious, both sexes densely aggregated in globose heads. *Male* calyx turbinate 4-fid, segments imbricate, stamens 4 opposite the calyx segments inflexed in the bud, anthers 2-celled dehiscing longitudinally and introrse, filaments flat at the base attenuated at the apex, rudiment of pistil small filiform. *Female* flowers sunk in a fleshy ovoid receptacle, calyxes connate and indistinct 4-toothed at the apex. Style terminal simple filiform, papillose towards the apex much exserted, ovary oblong 1-celled 1-ovuled, ovule pendulous, the receptacle in fruit bacciform, all the ovaries except 1 or 2 obliterated, seed pendulous, testa membranaceous, embryo exalbuminous amphitropal, cotyledons thick unequal folded, radicle small superior. *Trecul. Ann. Sc. Nat. 3rd Ser.* viii. 124. *t.* 4. *fig.* 121, 126 ;—*Batis in part Roxb.*

1. PLECOSPERMUM SPINOSUM, *Roxb.*—A small straggling tree or subscandent shrub, diœcious, branches long drooping or scandent, every axil with a long sharp somewhat recurved spine, leaves alternate rather remote obovato-oblong or oval obtuse glabrous shining entire, 2-3 inches long by 1½ inches broad, petioles 4-8 lines long. *Male* aments peduncled axillary or scattered, calyx 4-parted, segments somewhat emarginate or 2-lobed. Stamens 4 inserted round the subulate rudiment of a pistil. *Female* flowers axillary on a fleshy ovoid pedicelled receptacle, calyx indistinct 4-toothed at the apex, ovaries about 10-12 immersed in the pulp of the receptacle. Style single crooked long pubescent, berry generally only 1 comes to maturity globular the size of a pea, as it ripens the receptacle is obliterated and becomes as a single 1-seeded berry. *Trecul Ann. des Sci. Nat.* iii. *vol.* viii. *p.* 124 ;—*Wight Icones tab.* 1963. Batis spinosa, *Roxb. Fl. Ind.* iii. 763.

A common plant throughout India and Ceylon, often used for hedges.

Analysis, Pl. XXVI, fig. 2.

1. Portion of a branch of male tree in flower.
2, 3. Male flowers, shewing 4 stamens and abortive ovary.
4. Male flower open.
5, 6. Anthers, front and back view.
7. Portion of a branch of female tree in flower.
8. Female inflorescence.
9. Vertical section of the same.
10. Vertical section of fruit.
11. Transverse section of fruit. (All copied from Wight's *Icones.*)

ALLÆANTHUS. Thw.

For Gen. Char. see letter-press to Pl. cccv.

1. Allæanthus Zeylanicus, *Thw.*—For description, &c. see Pl. cccv.

ANTIARIS. Lesch.

For Gen. Char. see letter-press to Pl. cccvii.

1. Antiaris innoxia, *Blume.*—For description, &c. see Pl. cccvii.

STREBLUS. Lour.

Gen. Char. Flowers diœcious or monœcious, male capitate or spicate, female solitary or spicate. *Male* calyx 4-parted, segments sub valvate, stamens 4 opposite the calycine-segments inserted round the rudiment of a pistil, incurved in æstivation shooting out with elasticity, female sepals 4 imbricate in 2 series. Ovary 1-ovuled, ovules pendulous from the side close to the apex, style a little excentric 2-parted, arms subulate sometimes equal stigmatose, embryo exalbuminous, cotyledons fleshy often connate. Trees or shrubs unarmed, leaves serrulate. *Lour. Fl. Cochinch.* ii. *p.* 615 ;—*Miq. Fl. Ind. Bat.* i. 277. Epicarpurus, *Bl.* Trophis, *Retz* ;—*Roxb.*

1. Streblus aspera, *Lour.*—A small or middling sized tree, leaves alternate obovate to lanceolate often spathulate at the base, cuspidato-acuminate serrated towards the apex or along the whole margin, very rough above, 1½-6 inches long, 1-2½ inches broad, petioles 1-3 lines long. Male flowers capitate, heads axillary aggregated short peduncled, females axillary 1-2 together longish peduncled ; fruit drupaceous 1-seeded, testa crustaceous, cotyledons very unequal-sided. *Lour. l. c.* Epicarpurus orientalis, *Wight Icones tab.* 1961. Trophis aspera, *Roxb. Fl. Ind.* iii. 761.

A very common tree throughout India and Ceylon up to no great elevation, called Barinke in Teligu ; the leaves are used to polish ivory, and cart wheels are sometimes made from the wood ; in Ceylon it is called Gatta-nittool.

Analysis, Pl. XXVI, fig. 1.

1. Portion of a branch of the male tree.
2. A male flower bud.
3, 4. Male flowers shewing 4 stamens and the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Portion of a branch of female tree.
8. A female flower.
9. The same, more advanced.
10. Ovary more advanced.
11. Vertical section of ovary.
12. Transverse section of ovary. (All drawn from dried specimens.)
13, 14, 15. Analysis of the seed copied from Blume's drawing.

TAXOTROPHIS. Blume.

Gen. Char. Flowers diœcious, the male spicate or capitate, the female solitary loosely racemose few flowered. *Male* : the calyx 4-parted. Stamens 4 opposite, the sepals inserted round the rudiment of a pistil incurved in the bud ; anthers basifixed introrse. *Female* : sepals 4 subbiseriate slightly imbricate, ovary 1-ovuled resting in an obliquely cup or helmet-like receptacle the upper part of which has a perforation for the style, the ovule inserted at the side near the apex, style bifid the arms generally unequal, stigmatose on the inside, embryo inverse exalbuminous, cotyledons thick very unequal or foliaceous and subequal, radicle very short or elongated obtuse superior. Armed shrubs or trees, leaves alternate stipulate entire or serrate, flowers axillary. *Blume. Mus. Bot.* ii. 77. Epicarpurus, *Wight Icones* 1962. Trophis, *Roxb. in part.*

1. Taxotrophis Roxburghii, *Blume.*—A crooked tree, branches very irregular, thorns very strong straight sharp scattered over every part, often leaf and flower bearing, leaves rhombeo-ovate or obovate to oblongo-lanceolate acuminate with the upper half or only the apex very coarsely serrate undulate glabrous glandularly-punctate, 2½ inches long by 1 broad, petioles 2-3 lines long, sti-

pules acute. *Male* flower heads axillary globular with an imbricate involucre ; *female* peduncles axillary single short 1-flowered erect. Calyx-segments cordate at the base thence tapering to a long narrow point waved large persistent and increasing with the fruit, berry obliquely oval size of a cherry half immersed in the increased receptacle pulpy. *Bl. l. c.* 279. Trophis spinosa, *Roxb. Fl. Ind.* iii. 762. Epicarpurus spinosus, *Wight Icones* 1962.

Found on both sides of the presidency and in Ceylon, also in Timor.

Analysis, Pl. XXVI, fig. 3.

1. Portion of a branch of the female tree in flower.
2. A female flower.
3. Ovary.
4. Ovary cut vertically.
5. Ovary cut transversely.
6. Portion of a branch of the male tree in flower.
7. Male flower shewing the 4 stamens and abortive style.
8, 9. Authers, front and back view. (Nos. 1 to 5 from dried specimens; 6 to 9 copied from Wight's drawing.)

2. Taxotrophis Zeylanica, *Thw.*—A large branched shrub 8-10 feet high, sparingly thorny, ramuli puberulous, leaves glabrous membranaceous lanceolate or trapezoideo-lanceolate, obtusely acuminate mucronulate serrate to near the base minutely glanduloso punctulate, inflorescence racemose. *Male* short oblong denso-flowered ; *female* few flowered, fruiting pedicels elongated and thickened at the apex, sepals small at length inflexed and not increasing in fruit, cotyledons subequal foliaceous plicato-convolute, radicle longish. *Thw. En. Pl. Zey. p.* 264. Epicarpurus, *Thw. Hook. Journ. of Bot.* iv. *p.* 1. & *vol.* iii. *t.* 11.

Analysis, Pl. XXVI, fig. 3.

10. Portion of a branch of the female in flower.
11. Vertical section of female flower and ovary.
12. Portion of a branch of the male in flower.
13. Male flower bud.
14. Male flower open, 4 stamens and abortive ovary.
15, 16. Authers, front and back view. (All drawn from dried specimens.)

FICUS. Linn.

For Gen. Char. see letter-press to Pl. cccxiv.

Sec. Urostigma—*Stigma elongate villous.*

1. Ficus religiosa, *Linn.*—For description, &c. see Pl. cccxiv.

Ficus Arnottiana, *Miq.*, is not, I think, distinct as a species, sessile and peduncled fruit occurring on the same trees sometimes, and I have not distinguished F. Courtallense, *Miq*, or F. Lambertiana, *Miq.*

2. Ficus infectoria, *Willd.*—A large and beautiful tree with a spreading very dense head, sometimes dropping large roots from the trunk and branches, bark pretty smooth tough and peeling off in long slips ; leaves submembranaceous alternate ovato-oblong acute waved smooth, 5-7 inches long by 2-4 broad, petioles 1-1½ inches long. Stipules about 2 inches long slender grooved, with a colored gland round their apices, fruit paired axillary sessile or subsessile the size of a pea, roundish pretty smooth white when ripe. *Willd.* ;—*Roxb. Fl. Ind.* iii. 551 ;—*Wight. Ic.* 665. Urostigma ægeirophyllum, *Miq. Fl. Ind. Bat. vol.* 1. *Pars altera, p.* 333. U. infectoria, Tjakela et Ceylonense, *Miq. l. c.*

Malabar, &c. and Ceylon, up to 2000 feet elevation, also in Bengal. In Ceylon the bark is sometimes used instead of the Areca nut to chew with betel.

3. Ficus Wightiana, *Wall.*—A large tree, quite glabrous, leaves oblong, shortly acuminate, about 4 inches long and 1½ to 2 inches broad, rather stiff ; the primary veins arcuate and confluent at some distance from the edge, 3-nerved at the base, on petioles from 1½ to 2 inches long. Figs nearly globular, about 4 lines diameter, on peduncles of about 1 line, solitary or in clusters of 2 to 4 on the old wood below the leaves, with very small bracts under the fig. Urostigma Wightianum, *Miq. in Lond. Journ. Bot.* vi 566 ;—*Benth. Fl. Hong Kong. p.* 327. U. perseæfolium, *Miq. l. c.*

A variable species and closely allied to infectoria, but with larger fruit and generally smaller leaves. It is found throughout India, and in Ceylon and in Hong Kong.

4. Ficus Bengalensis, *Linn.*—An immense tree of great beauty, branches dropping roots which eventually become large trunks, leaves alternate about the extremities of the branches ovato-cordate 3-nerved entire often slightly undulate, when young downy on both sides, above glabrous or subglabrous in age, 5-6 inches long by 3-4 inches broad, just above the petiole on the under side is a broad smooth gland, petioles a little compressed 1 2 inches long downy. Stipules sheathing caducous leaving annular scars, fruit paired axillary sessile, when ripe red or yellow the size of a cherry. *Linn. Amœn.* Ficus Indica, *L.* Urostigma Bengalense, *Gaspar.*

This is the well known Banian tree, common throughout India, and much planted in avenues, topes, parks, &c. It is called Bar in Hindostani, Màree in Teligu, Ala in Tamil, and Màhà noogà in Ceylon. The wood is light coarse grained and brittle, of a light

brown color, not strong nor durable but possessing the valuable quality of being durable in water, it is used for making well rings; unseasoned it weighs 43·45 lbs, and when seasoned 36 lbs the cubic foot, and its specific gravity is ·576. The wood of the drop is stronger and tougher, and is used for yokes of bullock carts and other purposes. Birdlime is prepared from the tenacious milky juice, the leaves are sown together and used as plates to eat off.

5. Ficus tomentosa, *Roxb.*—A very large tree, and (like the last) giving out roots from its branches, but they do not grow large, young shoots woolly, leaves alternate oblongo-cordate slightly 3-nerved a little pointed entire, pretty smooth above, very downy beneath, 4-6 inches long, on the under side of the base of the costa there is a large smooth green gland (as in the last), petioles 1 inch long channelled woolly, fruit axillary paired sessile woolly the size of a large pea, when ripe gray, bracts three large spreading woolly *Roxb. Fl. Ind* iii. 550. Urostigma tomentosum, *Miq. l. c.* F. mollis, *Vahl* F. pubescens, *Roth.*

Common in subalpine tracts throughout the Presidency and in Ceylon; the wood is soft and light and of little use even as fuel.

6. Ficus Mysorensis, *Roth.*—A large tree, ramuli petioles young leaves stipules and figs densely ferrugineo tomentose, leaves ovate or ovato-elliptic shortly and abruptly acuminate equal-sided entire, thickly and rigidly coriaceous, in age glabrous or subglabrous above, primary veins 12 15 on each side spreading looped within the margin and often bifid towards the apex, figs axillary twin sessile oblong the young ones included in a thick calyptriform involucre, bracts 3 coriaceous sericeo-hirsute on the back. *Roth. Nov. Pl. Sp.* 390. Katon alon, *Rheede. Hort. Mal.* iii. 57. F. Gonia, *Ham. Prod.* 137. F. cotoneœfolia, *Vahl.* F. citrifolia, *Willd. Sp. Pl.* iv. 1137. U. dasycarpum, *Miq.*?

Malabar, &c., Mysore and Ceylon, called in the latter island Boonooga.

7. Ficus laccifera, *Roxb.*—A very large tree, young shoots smooth, leaves alternate cordate to oval obtuse or subacute entire 3-nerved at the base firm and polished, 4-7 inches long 2·5 inches broad, petioles 1-2 inches long flattened smooth. Stipules interfoliaceous smooth finely pointed; figs axillary in pairs sessile oval smooth as large as a gooseberry, involucre 3-lobed. *Roxb. Fl. Ind.* iii. 545;—*Wight Icones* 656. Urostigma, *Miq. l. c.*

Malabar, &c., and Ceylon, called in the latter island Noogà, also in Bengal.

8. Ficus tsiela, *Linn.*—An immense tree, bark smooth greenish, no roots from the trunk or branches, leaves alternate, somewhat 3-nerved ovato-oblong pointed entire firm smooth on both sides, shining particularly above, primary veins numerous simple parallel, 4-6 inches long by 1-2 inches broad, petioles a little compressed 1 2 inches long; stipules leaving no durable scars, fruit paired axillary sessile round turbinate smooth as large as a cherry when ripe purple, involucre of 3 leaves. *Roxb. Fl. Ind.* iii. 549. F. amplissima, *Linn.* Urostigma pseudo-tjiela, *Miq.*

An immense tree, common in subalpine tracts throughout the Presidency and in Ceylon. Much planted as an avenue tree, called Juvi in Teligu.

For dissections, see Pl. cccxiv

9. Ficus retusa, *Linn.*—A large tree, quite glabrous, leaves from broadly obovate or nearly orbicular to obovate-oblong, obtuse or obtusely acuminate, 1½ to 2½ inches long, 3-nerved at the base, the primary veins rather numerous, oblique, and joining in a continuous vein near the margin. Petioles stout, 2 to 4 lines long. Figs globular, about 4 lines diameter, closely sessile, solitary or in pairs in the axils of the leaves, the subtending bracts rather large. F. nitida, *Thunb*;—*Wight. Ic. t.* 642. Urostigma pisiferum, U. ovoideum U. nitidum, and U. retusum, *Miq. in Lond. Journ. Bot.* vi. 580, 581 *and* 582;—*Benth. Fl. Hong Kong* 327. F. Benjaminea, *Roxb. l. c. p.* 550.

A very common tree in subalpine tracts, called Yerra juvi in Teligu; found throughout India, also in China and the Archipelago.

10. Ficus Benjaminea, *Linn.*—A tree, branches slender flexuose weak hanging, petioles round 6-9 lines long, leaves ovate or elliptic-ovate acuminate, coriaceous surrounded by a smooth margin, 2-3½ inches long by 1-1½ broad, veins capillary horizontal looped at the margin; figs sessile axillary the size of a pea, bracts 3 ovate obtuse deciduous sericeous on the back, fruit smooth shining greenish-yellow with a tinge of purple. *Linn. Mantess. p.* 129. Urostigma, *Miq.* Ficus pendula, *Link.* Ficus striata, *Roth. Nov. Spec.* 387.

Canara and Bombay ghats, also in Java.

11. Ficus nervosa, *Roth.*—A large tree glabrous, leaves alternate or sub-opposite oblong acuminate smooth and shining above entire slightly 3-nerved at the base, 4-8 inches long, primary veins very prominent beneath, petioles 3-8 lines long, figs axillary solitary or paired turbinate smooth 4-5 lines in diameter, peduncles 3-5 lines long. *Roth. Nov. Pl. Sp.* 388. Urostigma, *Miq.* Ficus angustifolia, *Roxb. Fl. Ind.* iii. 554;—*Wight Icones* 660. Urostigma modesta, *Miq. l. c.*?

Malabar and Western ghats and Ceylon, up to 5000 feet, also in N. India.

12. Ficus comosa, *Roxb.*—A good sized tree with a large spreading shady top, bark pretty smooth, branches slender and often pendulous, leaves alternate oval obliquely-pointed entire firm smooth and shining coriaceous, 2-4 inches long, petioles very slender puberulous about 1 inch long grooved, figs terminal or in the exterior axils paired sessile turbinate as large as a gooseberry

apex depressed with the umbilicus rising a little in the centre which is shut up with scales, contracted at the base, smooth when ripe yellow, involucre 3-leaved. *Roxb. Fl. Ind.* iii. 552 ;—*Wight Icones tab.* 658. Urostigma pseudo-Benjamineum, *Miq. l. c.*

Mountains on the east side of the Presidency, Tinnevelly hills.

§ Sec. Ficus.—*Stigma short 2-cleft.*

13. Ficus asperima, *Roxb.*—A large tree, trunk erect, branches numerous spreading into a large head, leaves alternate about the ends of the branches broad oval obtusely pointed sometimes notched and even lobate, very scabrous a little wrinkled 3-nerved, 4-6 inches long, petioles about 1 inch long scabrous, figs axillary paired peduncled downy size of a gooseberry, yellow when ripe. *Roxb. Fl. Ind.* iii. 554 ;—*Wight Icones* 633.

Common in this Presidency, in Bombay, and in Ceylon ; called in the latter island Seerwana-maddeya ; the leaves are used as a substitute for sand-paper.

14. Ficus cinerascens, *Thw.*—A very large tree, ramuli asperulous, leaves coriaceous elliptic or oblong obtusely and very shortly acuminate glabrous above shining, paler beneath, punctato-asperulous, sub 3-nerved at the base rounded or a little narrowed, 3 6 inches long by 1½-3 inches broad, primary veins 9-12 on each side, petiole ½-1 inch long asperulous. Figs axillary 1 inch long spherical scabrous, 3-bracteated, peduncles solitary shorter than the petiole, calyx 5-leaved, stigma elongate. *Thw. En. Pl. Zey. p.* 266.

Ceylon, warmer parts of the island, called Wal-wona.

15. Ficus biglandulosa, *Miq.*—A tree, young shoots scabrous, leaves alternate short petioled oblong somewhat 3 nerved repand-serrate acuminate scabrous on both sides, 3-6 inches long, 1½-3 broad, furnished with 2 glands at the base, figs axillary solitary or in pairs peduncled rough the size of a small pea, umbilicus small depressed and shut with colored scales. *Miq. l c.* 229. Ficus exasperata, *Roxb. Fl. Ind.* iii. 555 not *Vahl* ;—*Wight Icones* 664.

Mountains on the east side of the Presidency ; the leaves are used to polish ivory.

16. Ficus parasitica, *Kœnig.*—A large tree, with a very spreading top and small pendulous roots issuing from the larger branches, leaves alternate obliquely oval or rhomboid, obtusely pointed a little scolloped very scabrous, 3-6 inches long by 1½-4 broad, often very unequal-sided, petioles channelled 2 3 lines long, figs paired axillary peduncled when ripe smooth yellow and as large as a pea, peduncles 2 lines long 3-bracteated at the base. *Kœnig. Miq. l. c.* F. ampelos, *Roxb. Fl. Ind.* iii. 553. F. pervia, *Miq. l. c.* F. cuspidifera, *Miq. l. c.* Ficus uniglandulosa, *Wall.* F. sclerophylla, *Roxb. l. c.* 546 ?

A very common tree throughout this presidency, and Ceylon and Bengal ; the leaves are used to polish ivory.

17. Ficus tuberculata, *Roxb.*—A small ramous tree, leaves rough oblong with a short acumen, entire 3-4½ inches long by ¾ to 1½ inches broad, petioles 3-8 lines long, figs paired axillary on peduncles 2-3 lines long, roundish, the size of a pea, tubercled with an elevated umbilicus. *Roxb. Fl. Ind.* iii. 554.

On the mountains on the east side of the presidency, called Kondà juvi in Teligu.

§ 3. Sec. Covellia.—*Stigma peltate concave.*

18. Ficus cunia, *Buch.*—A small or middling sized tree, leaves short petioled alternate oblongo-lanceolate cuneate or semicordate at the base, the lower half protruding in a large rounded lobe which is longer than the petiole, margins a little waved and serrated, scabrous on both sides, 6 12 inches long by 2-4 inches broad, figs peduncled somewhat turbinate a little ribbed of the size of a large filbert, hairy, in pairs or threes on long procumbent radicle and cauline compound leafless racemes often some feet long. *Roxb. Fl. Ind.* iii. 561. Covellia, *Miq. l. c.*

This tree I have only found on our eastern mountains, but it is common in Bengal, Birmah, Jubbulpore, &c ; its foliage is very beautiful.

19. Ficus hispida, *Linn. f.*—A small tree, the young branches hispid, leaves mostly opposite, petioled, from ovate or obovate to oblong, shortly acuminate, 5 or 6 inches long, crenate-serrate, very rough on both sides with short stiff hairs. Figs mostly on the old wood, 2 or 3 together on old spurs, which grow out into leafless branches of 1-2 inches, nearly globose, full ¾ inch diameter, shortly but densely hirsute, on short peduncles, bracteate at the top. Female perianth truncate, nearly as long as the ovary, but so thin and transparent that it is easily overlooked. Style short, with a concave peltate stigma F. oppositifolia, *Roxb. Pl. Corom. t.* 124 ;—*Wight Ic. t.* 638. Covellia oppositifolia, *Gasp.* ;—*Miq. in Lond. Journ. Bot.* vii. 461 and C. hispida, *Miq. l. c.* 462 ;—*Benth. Fl. Hongkong.* 329. C. dæmomum, *Miq. l. c.* F. dæmona, *Roxb. Fl. Ind.* iii. 462 ;—*Wight Icones.* 641. C. Assamica, *Miq. l. c.* C. dasycarpa, *Miq. l. c.* 465.

Very common throughout India and Ceylon, also in Java, S. China and the Archipelago.

20. Ficus glomerata, *Willd.*—A large tree, bark rusty greenish and scabrous, leaves alternate broad lanceolate entire smooth on both sides, beneath with minute green dots 4-6 inches long by 2-2½ inches broad, petioles channelled 1-2 inches long, racemes compound or panicled issuing from the trunk or large branches, branchlets spreading and jointed, bracts several surrounding the

joints, figs peduncled downy turbinate 1½ inches long when ripe orange colored, umbilicus closed with many scales, involucre of the fruit 3-leaved. *Roxb. Fl. Ind.* iii. 558 ;—*Wight Icones* 667. Covellia, *Miq. l. c.*

A common tree generally on banks of rivers.

LAPORTEA. GAUDICH.

For Gen. Char. see letter-press to Pl. cccvi.

1. LAPORTEA CRENULATA, *Roxb*—For description, &c. see Pl. cccvi.

BOHMERIA. JACQ.

Gen. Char. Flowers monœcious or diœcious in small dense unisexual heads, spikes or panicles. *Male* calyx or perianth usually of 4 (rarely 3) segments valvate in the bud with 4 (rarely 3) stamens. *Female* calyx enclosing the ovary 2-4-toothed. Ovary 1-celled with 1 erect ovule. Stigma subulate continuous with the ovary and persistent, fruit a seed-like nut enclosed in the thin calyx, seed albuminous. Small trees, shrubs or under shrubs, leaves alternate or opposite usually toothed. *Jacq. Stirp. Amer. Hist p.* 216. Splitgerbera *Miq.*

1. BOHMERIA TRAVANCORICA, *Bedd.*—A small weak tree, diœcious, ramuli pilose, leaves ovato-elliptic, with a longish acumination, serrate except at the base, 3-nerved in age glabrous above but (under the lens) densely covered with minute white dots, pilose beneath, 4-9 inches long (without the petiole) by 1½-3½ inches broad, petioles pilose, alternately very unequal, the longer ones 3½-4 inches, the shorter ½-1 inch long, flowers in both sexes in very small dense axillary heads 10-20 flowered, the female sessile, the male on pedicels scarcely ½ a line long. *Male* calyx 4-parted pilose on the outside, stamens 4 round the small rudiment of an ovary. *Female* calyx bracteolate at the base, subentire or inconspicuously 2-toothed at the apex above the ovary. Style very long pilose.

Travancore mountains, South Canara ghats, and on the Brumagherry hills, Wynaad, up to 4500 feet elevation.

Analysis, Pl. XXVII, fig. 2.

(Incorrectly under the name of B. ramiflora, which should be altered.)

1. Portion of a branch of the male tree in flower, leaves 3-nerved, flowers in dense axillary heads.
2. A male flower bud, segments valvate.
3. A male flower open.
4. A male flower 4-sepaled, shewing the insertion of the 4 stamens round the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Portion of a branch of the female tree in flower, and shewing how very unequal the alternate petioles are.
8. Highly magnified head of female flowers.
9. A female flower and bract.
10. The same more advanced, cut open to shew the ovary.
11. Vertical section of the ovary 1-celled, 1 erect ovule.

OREOCNIDE. MIQUEL.

Gen. Char. Flowers diœcious in little axillary or lateral capitate clusters which are either sessile or on clustered or solitary peduncles. *Male* perianth 4-(rarely 3)-parted, segments valvate in the bud, stamens as many inserted round the small obovate rudiment of a pistil. *Female* perianth adnate to the ovary tubular ventricose minutely 4 5-toothed at the apex. Ovary 1-celled with 1 erect ovule. Stigma disk-shaped subpeltate long-ciliate, fruit dry adhering to the somewhat succulent perianth. Seed albuminous. Small weak trees or shrubs, leaves alternate entire or crenulate penniveined or 3-nerved glabrous or pubescent, female flowers arising from little fleshy cup-like beds and furnished with numerous bracts. *Miquel. Pl. Jungh.* i. *p.* 39. Villebrunea, *Gaudich Bot. Voy. B. t.* 91, 92 ;—*Bl. Mus. Bot.* 2 *p.* 166.

1. OREOCNIDE SYLVATICA, *Miq.*—A small weak tree, young ramuli strigose, leaves oblongo-elliptic with a long acumination, penniveined, obsoletely crenulate towards the apex, 5-8 inches long by 1½-2¼ inches broad, primary veins 6-7 on each side, above glabrous, furnished with minute white dots, (under the lens), beneath strigose on the costa and veins, petioles strigose, unequal in length, ½-1½ inches long. Stipules linear lanceolate acuminate subscariose 3 4 lines long soon caducous but present at the apexes of the branches, peduncles axillary strigose twin dichotomous or more compound shorter than the petioles. *Miq. l. c. p.* 40. Urtica sylvatica, *Bl. Bijdr. p* 506. Boehmeria sylvatica, *Hassk.* Villebrunia sylvatica, *Bl. Mus. Bot.* ii. *p.* 165 *tab.* 15 ;—*DC. Prod.* xvi. 235[21], and V. appendiculata, *DC. l. c* ?

Common in Coorg and on the South Canara ghats, also in Ceylon and Java. I have only the male plant, and my analysis of the female is taken from Blume.

(Oreocnide frutescens is a small under shrub (with 3-nerved leaves) found on our Western ghats.).

Analysis, Pl. XXVI, fig. 4.

1. Portion of female branch in flower.
2. Male inflorescence magnified.
3. A male flower.
4. A male flower open.
5, 6. Anthers, front and back view (drawn from dried specimens).
7. Female inflorescence magnified.
8, 9. Young fruit.
10. Vertical section of the ovary (the ovule should appear erect, not pendulous.)
11. Vertical section of fruit.
12. Transverse section of fruit.
13. Seed. (All from Blume's figure.)

MOROCARPUS.

Gen. Char. Flowers monœcious or diœcious, densely capitate surrounded by bracteoles. *Male* calyx 4-3-parted, segments equal, valvate in the bud, stamens 4-3 opposite the calyx-segments, filaments filiform, anthers introrse 2 celled fixed at the back, cells opposite, rudiment of pistil small. *Female* calyx turbinate closely cohering to the ovary, constricted above and obsoletely 3-4-toothed. Ovary attenuated below into a stipe (adnate with the calyx) straight or a little oblique 1-celled, ovule 1 erect from the base orthotropal, stigma terminal sessile, very shortly apiculate or obtuse, papillosely ciliate, berry pyriform succulent; embryo inverse in fleshy albumen, cotyledons plano-convex, radicle short superior. Weak trees or shrubs, leaves alternate serrate, often rugose beneath snowy or hoary-tomentose receptacle of the fruit scarcely fleshy. *Sieb. et Zucc.* Debregeasia, *Gaud. Bot. Voy. Bon. t.* 90.

1. Morocarpus longifolius, *Burm.*—A small erect weak tree, leaves lanceolate acute or acuminate 3-nerved, sharply serrate rugose above prominently reticulated, strigose on both sides, snow-white beneath, inflorescence axillary cymose, fruit capitate yellow made up of an aggregation of small globose drupes. Sarcocarp fibrous pulpy studded over with resinous tubercles. Urtica longifolia, *Burm. Fl. Ind. p.* 197. Morocarpus, *Bl. l. c.* Debregeasia velutina, *Gaud.* Conocephalus niveus, *Wight Icones* 1959. Missiessya velutina, *Wedd.*

Very common in our western jungles up to 7000 feet, also in Ceylon, North India and Java; in Ceylon it is called Gassdool, and fishing lines are made of the bark.

Analysis, Pl. XXVI, fig. 5.

1. A portion of a male branch in flower.
2. Male inflorescence.
3. Male flower bud.
4. A male full flower.
5. Portion of a female branch in flower.
6. Inflorescence.
7. Portion of the same cut vertically.
8. Portion of the same highly magnified.
9. Female flower.
10, 11. Sections of the same. (Drawn from living specimens.)

This order is represented in our western moist forests by numerous herbaceous plants belonging to the following genera. In *Artocarpeæ*, Dorstenia and Pogonotrophe, and in *Euurticeæ*, Fleurya, Gerardinia, Pilea, Lecanthus, Pellionia, Elatostema, Procris, Chamabainia, Pouzolzia, Memorialis, and Droguetia.

ORDER LXXI.—CASUARINACEÆ.

Branching weeping trees, with jointed shoots, the internodes of which are striated. Leaves 0; in their room short, toothed, ribbed sheaths. Flowers male and female, each with a single bract. Male in spikes. Flowers whorled about the articulations of the jointed rachis. Bracts 2, membranous, right and left of a two-leaved calyx, the sepals of which stand fore and after, and adhere at their points, and at the time of flowering are separated from their bases and carried up by the stamen in the form of a calyptra to the anther. Stamen 1; filament subulate; anther erect, two-celled, with parallel contiguous cells opening by a longitudinal fissure. Female in dense heads. Rachis not jointed. Calyx 0. Ovary one-celled, with one obliquely ascending orthotropal ovule, or two standing side by side. Style 2, united at the base. Caryopsides winged, collected in a cone, hidden in thickened bracts, sessile. Seed erect, coated densely with spiral vessels, without albumen; radicle superior.

CASUARINA. Linn.

Gen. Char. the same as that of the order.

The Casuarinas are none of them indigenous to Southern Indian. Casuarina equestifolia (of which C. muricata is a synonym) is very common, particularly near the sea coast throughout India, and in fact in all tropical countries, but it was introduced into this Presidency about 70 years ago from the Archipelago or Chittagong; it yields a strong fibrous and stiff timber of a light reddish brown color, capable of sustaining a great cross strain; a cubic foot unseasoned weighs 63-68 lbs. and 55 lbs. when seasoned, and its specific gravity is ·880; it is extensively grown for firewood, and there are large plantations on the sea coast near Madras and in the sandy beds of rivers inland.

Casuarina stricta, quadrivalvis, paludosa and leptoclada have been introduced on to the Nilgiris from Australia.

SUB CLASS IV, GYMNOSPERMÆ.

ORDER LXXII.—CYCADACEÆ.

Small trees or shrubs, sometimes resembling Palm trees in their aspect. The stems are either simple and cylindrical, or spheroidal, or dichotomously branched, and in all cases strongly marked with the lozenge shaped scars of broad woody leaf-stalks. Internally the stem consists of a mass of pith traversed by woody bundles and rings of woody matter, sometimes irregularly disposed, sometimes collected into regular and numerous concentrical circles, always pierced by medullary plates. The wood consists of glandular woody tissue and spiral vessels. The leaves are pinnated, hard and woody, perennial, generally circinate when young but in some instances flat; the leaflets have fine simple veins, and are placed somewhat obliquely on their petiole, from which they finally disarticulate. Flowers male, female, perfectly destitute of all trace of calyx and corolla. Male collected in terminal cones, consisting of scales covered over their lower side with anthers which are one-celled, often collected in twos and threes, and split longitudinally. Pollen hyaline angular, collected in masses. Female consisting of naked ovules, placed beneath peltate scales, or at the base of flat ones, or on the margins of contracted leaves. Seeds hard or spongy-coated nuts, with one or more embryos suspended by a long funiculus in a central cavity of large white fleshy or mealy albumen; the cotyledons unequal, more or less connate; radicle superior.

CYCAS. Linn.

Gen. Char. Male ament strobile-shaped, its imbricate acute pointed scales covered on the under side with distinct sessile 1-celled 2-valved anthers. *Female*, the imbricate spadices with 2-6 solitary distant alternate or opposite more or less immersed naked 1-celled ovules, the apex sterile and pinnatifid, serrate or subentire. Palm like small trees or shrubs with much the appearance of ferns, leaves pinnatifid or subpinnate, leaflets or segments 1-nerved, petiole often spiny, vernation of the rachis straight, of the leaves or segments circinate.

1. Cycas Rumphii, *Miq.*—A small palm-like tree seldom more than a few feet high, trunk sometimes branched, leaves spreading round the crown numerous subpinnate of a smooth shining deep green 3 to 6 feet long, leaflets or rather segments 50-60 on each side rather remote opposite or alternate, linear-lanceolate sickle-shaped acute flat very smooth and entire, 4-10 inches long and ½ an inch broad, petioles nearly round smooth 12-24 inches of the base destitute of leaves and often armed with a row of short sharp spines on each side. *Male* strobile elevated on a short thick firm peduncle from the crown of the plant ovate oblong, being at first 9-10 inches long, at length double as long, by 5 inches in diameter, scales numerous imbricate wedge-shaped obliquely truncate, fulvo-tomentose with a large erect subulate point from the exterior upper angle, anthers entirely covering the under surface of the scale 1-celled 2-valved. *Female* spadices the outer elongate narrow cuspidate villous and barren, the inner compressed clavate spathulate 2-edged and bearing on each side about the middle 2-3 round smooth ovaries, style minute with a perforated callous margined stigma, spadex incurved towards the apex and of a dilated rhomboid-shape, the exterior margins pinnatifid or subentire, fruit oval size of a small pullet's egg smooth yellow. *Miq. in Bull. Sc. Phys. et Nat. Neerl. p.* 45. C. circinalis, *Roxb. Fl. Ind.* iii. 744.

Cultivated in gardens, but probably an introduction from the Moluccas.

2. Cycas circinalis, *Linn.*—Very similar to the last, leaflets or segments 80-100 pair generally smaller than in the last and the petioles longer and more armed. *Male* scales tapering from the middle into very long incurved subulate points. Female spadices with 3 6 ovaries on each side, beyond which they rise in a curve and expand into an ovato-triangular-shape with long subulate points and the margins deeply and acutely toothed, the rest as in Rumphii. *Linn. Sp. Pl.* Todda panna, *Rheed. Mal.* 3 *p.* 9. Cycas sphærica, *Roxb. Fl. Ind.* iii. 747.

Very common in all our dry subalpine forests on the west side of the Presidency up to 3500 feet elevation. Some of the hill tribes in the Anamallays and elsewhere almost live upon the flour obtained from the seeds when in season.

A third species, which I take to be C revoluta, is common on the Cuddapah and other hills on the east side of the presidency; its leaflets are very narrow with revolute margins, and the costa most prominent and raised beneath. I have however never seen it in flower.

ORDER LXXIII—CONIFERÆ.

Flowers monœcious or diœcious, in cylindrical or short catkins, with closely packed scales, or the females solitary. Stamens inserted either on the axis of the catkin under the scales, or the anther-cells sessile on the inside of the scales themselves, which then form part of the stamens. Ovules and seeds *naked*, that is, without ovary, style or pericarp, either inserted under the catkin scales or solitary and quite exposed. Seeds albuminous. Embryo axile, usually with 3 or more cotyledons. Trees or shrubs, mostly with resinous secretions. Leaves stiff entire lanceolate subulate or linear, or short and scale-like or lobed or divided.

PODOCARPUS. Herit.

For Gen. Char. see letter-press to Pl. cclvii.

1. Podocarpus latifolia, *Wall.*—For description, &c. see Pl. cclvii.

This is the only tree of the order indigenous in Southern India. Numerous species of Araucaria, Cupressus and Pinus have been introduced chiefly on to our mountains, and the following genera are also represented—Dammara, Cedrus, Sequoia, Cryptomeria, Frenela, Callitris, Thuya and Juniperus.

CLASS II.—MONOCOTYLEDONS.

ORDER LXXIV.—PALMÆ.

Flowers unisexual or polygamous. Perianth dry and calyx-like of 6 lobes or segments, in 2 distinct series, contorted or valvate in the bud. Stamens 6, or rarely more, or 3 only. Anthers versatile, 2-celled. Pistil usually of 3 carpels, free or united in a 3-celled ovary. Ovules solitary or rarely 2 in each cell, erect. Stigmas 3, usually sessile, undivided. Fruit either a 3-celled or 1-celled drupe or berry, or of three distinct drupes or berries. Seed erect or laterally attached. Embryo small, in a cavity near the outside of a hard albumen. Stems woody, usually simple and often attaining a great height. Leaves large, usually at the summit of the stem, folded in the bud, and pinnately or palmately divided. Flowers usually sessile, in simple or paniculate spikes, enclosed when young in large sheathing bracts, called spathas, and usually with 3 small bracts or bracteoles under each flower.

It is not intended to figure or describe the Palms in this work, as I have not the material to attempt it. We have at least 7 or 8 species of Calamus (rattans) in our western jungles, and 7 species, nearly all distinct from ours, inhabit Ceylon. Caryota urens (the bastard Sago), Corypha umbraculifera (the Talipot), several species of Phœnix (date), a small Areca, 1 species of Arenga and Bentinckia Condapana inhabit our forests; the latter is confined to South Tinnevelly and Travancore. Corypha Areca and Arenga are only found in our western moist forests, but the others are general over the Presidency, and in Ceylon Ptychosperma rupicola and Oncosperma fasciculata and Areca concinna are small indigenous palms. Borassus flabelliformis (the Palmyra), Cocos nucifera (the Cocoanut), and Phœnix sylvestris (date), are largely planted throughout India, chiefly near the coast, and Areca catechu (the Areca-nut) also forms plantations.

ORDER LXXV.—PANDANACEÆ.

Flowers unisexual, densely sessile, in simple or branched spikes or heads. Perianth none or rarely 3 or 4 valvate sepals. Male flowers: Stamens several, filaments filiform. Anthers 2 or 4-celled. Female flowers: Ovaries 1-celled, entire, with 1 laterally inserted ovule or with many ovules on parietal placentas. Stigma usually sessile. Fruit a berry or drupe. Embryo small, in the base of a fleshy or horny albumen. Stems herbaceous, shrubby or arborescent, often branched. Leaves entire or divided.

PANDANUS. Linn.

Gen. Char. Flowers diœcious. Males in small dense spikes, sessile in the axils of leafy or coloured bracts, forming a terminal compound spike. Stamens indefinite. Anthers 2-celled. Female flowers: Ovaries very numerous, densely packed in a globular or oblong spike or head, with 1 ascending ovule in each. Stigmas sessile on the flat tops. Drupes cohering in clusters in a large cone-like head. Stem arborescent, branching. Leaves long, linear-lanceolate, coriaceous prickly on the midrib and edges, spreading and generally closely inserted round the stem in 3 spiral series.

The Screw pines, often called swamp pine-apples, or Kildàr (the native name), scarcely deserve a place in this work, the substance of the most solid wood being something like that of a cabbage stalk, which by age has acquired a woody hardness outside; there are 2 species common all over the Presidency, Pandanus odoratissimus, *Willd*, and Pandanus furcatus, *Roxb.*

ORDER LXXVI.—GRAMINEÆ.

Flowers hermaphrodite or unisexual, in *spikelets* without any perianth. Each spikelet consists of 3 or more (very rarely 2 or 1) chaff-like concave *glumes* (scales or bracts) arranged alternately on opposite sides of the spikelet, their concave face towards the axis (Two sometimes 1 or 3) lowest glumes empty and often differently shaped from the others, the succeeding or *flowering glumes (lower paleæ)*, each enclosing a smaller scale or *palea* (upper palea) placed either between the glume and the axis of the spikelet, with its back to the axis, or nearly opposite the glume at the end of the axis. Within the palea, or apparently between the flowering glume and palea, is the real flower, consisting usually of 2 *lodicules* or minute microscopical scales besides the stamens and pistil. The flowering glume and palea are however generally included in the term flower. Stamens usually 3, occasionally reduced to 2 or 1, or in some genera 6 or more; anthers versatile, 2-celled. Ovary 1-celled, with 1 ovule. Style 2 or 3-lobed, or more frequently divided to the base into 2 or 3 more or less feathery styles. Fruit 1-seeded and seed-like, called a *grain* or *caryopsis*, free or adhering to the persistent palea, or enclosed in the hardened palea and flowering glume. Pericarp very thin, adhering to the seed or rarely loose or opening in 2 valves. Embryo small, at the base of a mealy albumen. Herbs, with stems usually hollow except at the nodes, sometimes shrubby or arborescent in their stature and hardness of the stem, but very unlike dicotyledonous trees or shrubs. Leaves alternate entire parallel-veined (usually long and narrow), sheathing the stem at their base, but the sheaths split open on the side opposite the blade and often end within the base of the blade in a scarious appendage called a ligula. Spikelets arranged in terminal spikes, racemes, or panicles.

TRIBE BAMBUSACEÆ.

Arborescent or shrubby grasses, culms up to 120 feet high or even more, sometimes scandent hollow or rarely nearly solid generally much branched at the nodes, thorny or unarmed, leaves articulated at the base, often deciduous at an early date. Sheath generally fimbriate at the apex, ligula always present. Spikelets several or many-flowered, never 1-flowered, the lower palea many-

nerved, the upper one 2-6-many-nerved keeled or without a keel, very rarely absent. Scales 3 sometimes many or by abortion 2 or none. Stamens 3-6 or many (in Beesha), filaments free at the base or monadelphous. Style 2-3 4 fid or divided to the base, caryopsis free or (in the Section Bacciferæ) included in the perigynium.

§ *Section I.*—TRIGLOSSÆ.

Culms unarmed, shrubby scarcely arborescent often scandent, spikelets many or few flowered, the upper palea always 2-keeled. Stamens 3 free at the base, connective never elongated, scales 3 always present, style 2-3 parted from above the base, caryopsis oval oblong or linear oblong, scutellum exposed.

*ARUNDINARIA.

§ *Section II.*—BAMBUSEÆ.

Culms armed or unarmed thick hollow or rarely solid, arborescent lofty or rarely shrubby, spikelets many flowered often many bracteated, upper palea concave and 2 keeled or convex and keelless. Stamens 6, filaments free or monadelphous, connective obtuse or apiculate; scales 3 or by abortion 2 or rarely altogether wanting, style short trifid, or more or less lengthened and simple, the apex only 2-3 cleft, caryopsis oval or oblong or narrow linear-oblong, scutellum exposed.

Stamens 6 free at the base, scales generally 3 normal rarely 1-2-3 abnormal	BAMBUSA.
Stamens 6 monadelphous at the base, spikelets long cylindric narrow, scales none	OXYTENANTHERA.

§ *Section III.*—BACCIFERÆ.

Culms unarmed hollow rarely solid, arboreous or shrubby often scandent, stamens 6 or numerous (Beesha) free at the base or monadelphous, connective obtuse or apiculate, scales 3 many or deficient, style long simple included in the beaked perigynium, at length 2 3 cleft, stigmas often revolute. Fruit sometimes large bacciform or pomiform included in the perigynium, scutellum therefore not visible.

Spikelets elongate many-flowered, flowers 3-5 fertile, scales 3, fruit rostrate	TEINOSTACHYUM.
Spikelets subcylindric only 1 floret bipalaceous and hermathrodite, scales many (or rarely 3), stamens many (or 6), fruit large with a long beak	BEESHA.
Spikelets oblong or ovate, 2 or more florets perfect. Scales none, fruit oblong generally beaked...	DENDROCALAMUS.

All six genera are represented in this Presidency, and all but Dendrocalamus in Ceylon. The largest and most important of our bamboos is the Bambusa arundinacea, this is found throughout our Presidency, and grows to 80 feet high with its culms up to 6 or even 8 inches in diameter, it is a most valuable product, and yields a very considerable revenue to the Forest Department, being in universal use for building purposes, timber rafts, scaffoldings, fencing, trellis-work, furniture, fishing rods, ladders, mats, baskets, window-blinds, and many other purposes; and when it seeds the bamboo-rice (as the natives call the seed) feeds thousands of poor people; the leaves are good fodder, and the young shoots are made into preserves and pickles, and are the most favorite food of elephants. This species is absent from Ceylon, where its place is taken by B. vulgaris. The next in importance is the Dendrocalamus strictus, well known as the *Male bamboo*; this is also a large species, but smaller than the last, and with solid or almost solid stems; it is much in use for spear-shafts and building purposes; it is abundant on the drier slopes of many of our mountains. Arundinaria Wightiana is the hill reed or small hill bamboo so abundant on the higher ranges of the Nilgiris, and much in use for various purposes. Teinostachyum Wightii is the large broad-leaved Elephant reed so common about the lower slopes of the mountains of Coimbatore, Malabar, &c, in moist localities, and Beesha Travancorica is the Elephant grass or Irul of Travancore, a reed which covers immense tracts on the Travancore and Tinnevelly mountains, often to the entire exclusion of all other vegetation. Oxytenanthera Thwaitesii is a large straggling weak thornless reed common about the outskirts of dense moist forests 3500-6000 feet elevation, very abundant on the Anamallays. Bambusa arundinacea dies down after it flowers and springs up again only from seed. A very general flowering takes place almost throughout our western forests about every 30 years, and nothing but dead culms are to be seen over miles of the bamboo tracts, and the forest fires are much intensified; this occurred 3 or 4 years ago all over the Wynaad, Malabar, Coorg and South Canara, extending over a period of 2 or 3 years, and I learn from many quarters that a similar event took place about 30 years ago, and from records I see it occurred also about 1804. The plant takes several years before it again attains any growth from the seed, and its loss is much felt in the meantime; but when the large culms are once shot forth, they grow with great rapidity (sometimes a foot or more in 24 hours.) Every year, however, individual clumps or individual culms are to be found in flower and in a dead or dying state. The male bamboo (Dendrocalamus strictus) flowers every year and does not die down. The Arundinaria Wightiana flowers and dies down annually, springing up again rapidly from the same roots, attaining its full size in one season.

Some species of the tribe flower only at long intervals, and there are several on our mountains which I have never yet pro[illegible] except in leaf, and which are probably new or at least not identified. One growing over the top of Pedrotalla galle in Ceylon has been watched by Dr Thwaites for many years, and has never yet been found in flower.

Colonel Munro points out in his *Monograph* that the section Bacciferæ differ from the others in their peculiar fruit, the pistil or style generally appears to be contained in an envelope called a perigynium, somewhat analagous to the sac which contains the seed of Carex in the young state; this is so closely attached to the style that it is almost impossible to separate it, but towards maturity it increases in various ways: in Beesha Travancorica it becomes fleshy, and the fruit attains the size of a pullet's egg with a very large beak, the scutellum is concealed in this envelope and not visible externally, whereas in the true bamboos the seed is like oats or wheat, linear or oblongo-linear with a distinct furrow down one side and the scutellum very visible below.

ARUNDINARIA. MICHAUX.

Gen. Char. Shrubby rarely arboreous, culms erect, branches sometimes fasciculate at the nodes or almost verticellate. Spikelets imperfect above, shortly pedicellate between the glumes 3-5-12 flowered, rachilla articulate, florets imbricate distichous distant bipaleaceous hermathrodite or very rarely the lower male, the upper ones occasionally abortive, glumes very variable acute or obtuse sometimes distant, few-many-nerved, the lower always shorter rarely wanting, lower palea acuminate or acuto-mucronate concave many-nerved glabrous or hirsute membranaceous, the upper one 2-keeled channelled compressed the back narrow. Sides flat connivent, equal or nearly equal to the lower one. Stamens 3 short free, scales 3 conspicuous membranaceous ovate or lanceolate ciliate acute or obtuse, style entire at the base soon dividing into 2-3 plumose stigmas, caryopsis oval or oblong or linear-oblong deeply furrowed on the back. Leaves generally small, the transverse veinlets obscure or conspicuous, inflorescence generally terminal in branched panicles or simple racemes. *Michaux Fl. Bor. Amer.* 1. 74. Miegia, *Pers.*—Ludolfia, *Willd.*—Triglossum, *Fisch.*—Macronax, *Rafin.*

ARUNDINARIA WIGHTIANA, *Nees.*—An erect shrubby reed, culms 6-12 feet high much branched at the nodes, leaves ovate-lanceolate setaceo-acuminate beneath a little glaucous and often glandulose near the costa at the base on the underside, 1½-7 inches long by 3-12 lines broad cuneate at the base and shortly petiolate, the margin membranaceous scabrous with very minute recurved prickly points (under the lens) or quite glabrous in age, primary veins 4-6 on each side, transverse venules pale rather conspicuous. Sheaths striated hispid or glabrous on the same branch, the mouth fimbriate with 1-2-3 long setæ, ligula elongate or very short, panicles terminal 4-8 inches long very compound, the branches capillary and flexuose furnished with glands in the axils, spikelets on long slender pedicels, 2-5 flowered purplish in colour nearly glabrous or slightly hirsute, 4-6 lines long, the rachillæ articulate subclavate scabro-hirsute, glumes nerved acuminate or obtuse ciliate at the apex, the lower one generally acuto-mucronate 2-5-nerved the upper one 7-nerved at the base acuminate, the lower palea 5-7-nerved mucronate scabrous (under the lens), the upper one about as long bicuspidate at the apex without nerves, stamens 3 free, style soon bifid, scales 3 equal and similar ovate obtuse or acute, margins fimbriate, nerved. *Nees in Linnæa* ix. 482 ;—*Munro Monog. p.* 19. A. hispida, *Steud.* A moliniformis, *Hochst.*

This reed is abundant on the higher ranges of the Nilgiris; it is much in use for a variety of purposes.

Analysis, Pl. XXVIII, fig. 2.

1. A spikelet highly magnified.
2, 3. Portions of the same shewing clearly the articulated rachilla.
4. A glume.
5. A lower palea.
6. A fertile floret shewing the upper and lower palea and the articulated rachilla of the abortive terminal floret (which has fallen off.)
7. Side view of the upper palea, the 2 keels ciliate.
8. Inside view of the same, shewing its bifid apex, and the 3 stamens.
9. 2 of the 3 stamens removed from a floret.
10. A fertile floret the palea and 2 of the stamens removed, exposing the 3 large ovate fimbriate scales, the ovary, and deeply bifid style.

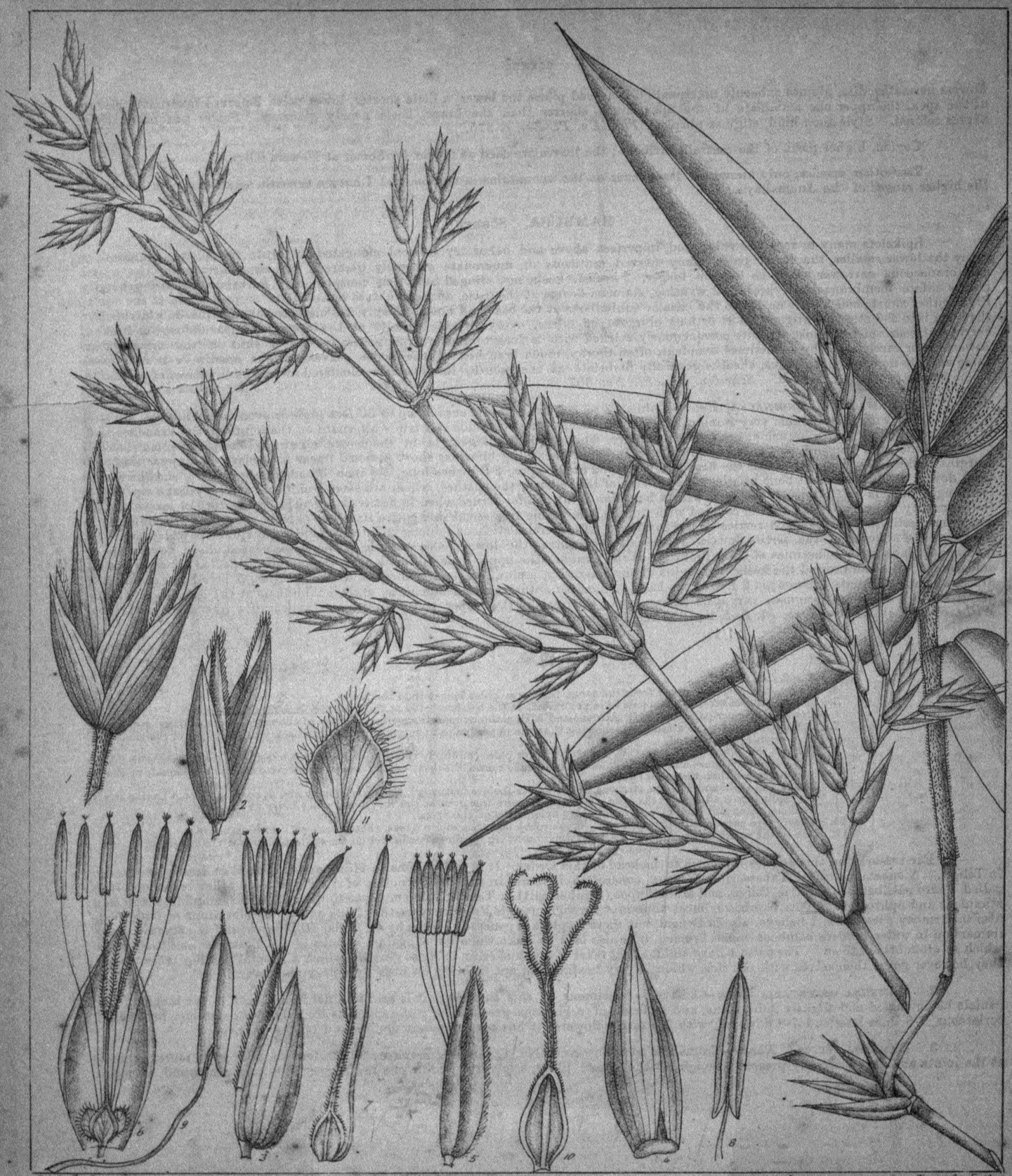
2. ARUNDINARIA FLORIBUNDA, *Thw.*—An erect shrubby reed, culms 2-5 feet high, leaves lanceolate setaceo-acuminate, prickly on the membranaceous margin (under the lens), primary veins 3-4 on each side, transverse venules conspicuous, sheaths striated often hispid when young, in age glabrous, the mouth fimbriate with many long setæ, panicles very compound, terminal, 4-6 inches long, sparingly glandulose in the axils, spikelets lax 4-8 flowered sericeous an inch long or more, glumes unequal, acute, nerved, ciliate at the apex, the lower one smaller 2 lines long ; the lower palea pubescent 3½ lines long nerved subulato-acuminate, the upper one about as long bicuspidate at the apex. Scales 3 unequal 2 obliquely lanceolate, margin ciliate the 3rd narrower, scarcely nerved, ciliate, style soon bifid, stigma beautifully plumose, fruit purple 1¾ lines long linear rather hirsute at the apex crowned with the remains of the bifid style. *Thw. En. Pl. Zey. p.* 375.

Ceylon, central provinces, at 5000 feet elevation. Very like No. 1, but the spikelets longer and silky and containing more flowers.

3. ARUNDINARIA WALKERIANA, *Munro.—Culms?* Leaves ovate or oblongo-ovate with a long sharp acumination, rounded at the base and cucullate just above the short petiole, the margins thickened and asperous with minute recurved prickly points (under the lens) or glabrous in age, primary veins 5-7 on each side, transverse venules very numerous and prominent, 3-7 inches long by ¾-1½ inch broad, sheaths striated glabrous the mouth furnished with very numerous long setæ, panicles very compound 4-5 inches long, the branchlets angled glabrous, glandulose in the lower axils, spikelets colored glabrous 3-4 flowered, 10-12 lines long shortly pedicellate between the glumes, glumes scarcely unequal, the apices ciliate at the margins, the lower one acute with 1 prominent and 4 inconspicuous nerves, the upper one with 3 prominent and 4 inconspicuous nerves acuminate or obtuse, lower palea 9-nerved oblong acute and ciliate, the upper one equal obtuse or bifid at the apex subhirsute 2-keeled, the keels ciliate above. Scales 3 membranaceous obtuse, margins ciliate, 2 larger; style tumid at the base, soon divided into 2 broad compressed stigmas. *Munro. Monog. p.* 21.

Ceylon, higher parts of the central provinces ; the cartilaginous margin at once distinguishes this, and it has much broader leaves than the other species.

4. ARUNDINARIA DEBILIS, *Thw.*—Culms much elongated glabrous or with the sheaths hispid, leaves small 1½-3 inches long by 3 lines broad furnished with longish white hairs on both sides when young glabrous in age, lanceolate with a setaceous apex somewhat glaucous, primary veins 2 on each side, transverse venules inconspicuous or wanting, sheaths ciliate with 2-4 setæ at the mouth, panicles simple terminal the branchlets short subverticelled few-flowered, spikelets 3-flowered 5-6 lines long, the 2 lower



Covendo Del. Dunnity Lith

Bambusa arundinacea Ker.

See Manual under Bambusa.

flowers hermathrodite, glumes subacute mucronate 6-7 nerved pilose the lower a little shorter, lower palea 7-nerved mucronate hirsute at the apex, the upper one acuminate at the apex much shorter than the lower, keels nearly glabrous. Scales unequal narrow. nerves colored. Style soon bifid, stigmas purple. *Thw. En. Pl. Zey. p.* 375.

Ceylon, higher parts of the central provinces ; the leaves are used as fodder for horses at Newera Ellya.

Two other species, only known in leaf, occur on the mountains in Ceylon, and I have a seventh species only in leaf from the higher ranges of the Anamallays.

BAMBUSA. Schred.

Spikelets many or rarely few-flowered, imperfect above and below, cylindrical elongated or ovate or oblong, glumes 2 or many the lower smaller, the lower palea many nerved muticous or mucronate generally glabrous coriaceo-chartaceous, the upper membranaceous narrower nearly as long or longer, 2-keeled, keels not winged but often conspicuously fimbriate, scales 3 generally obtuse ciliate membranaceous, rarely 1-2 wanting, stamens 6 free at the base, anthers obtuse or apiculate or penicellate at the apex. Style rather short soon 3-cleft nearly to the base or subbulbous at the base and not so deeply 2-3 cleft, or long simple only divided at the apex into 2-3 stigmas, stigmas short or long plumose or pilose, ovary obovate hirsute at the apex or linear-oblong or beaked, caryopsis linear-oblong obtuse or acute conspicuously marked with a longitudinal furrow generally closely shut in the upper palea. Arboreous or rarely shrubby, sometimes scandent, often thorny, much branched at the nodes, leaves various narrow or broad, transverse veinlets none or conspicuous, sheaths generally fimbriate at the mouth, inflorescence clustered along the branches of a panicle, which is also generally clustered. *Schreber. Gen. Pl. No.* 607.

1. Bambusa arundinacea, *Retz.*—Culms 12 to 100 from the same root up to 80 feet high or even more, hollow, jointed, undivided but with innumerable very ramous spreading branches, thorns double and triple alternate on the joints of the branches and branchlets, when double a branchlet occupies the centre, when triple the largest is in the centre, all strong sharp and somewhat recurved, (sometimes wanting, particularly in rich soils ?), leaves sheathing bifarious short petioled linear lanceolate, the upper side and margins backwardly hispid, broad at the base finely pointed at the apex, 2-6 inches long, ½-¾ inch broad (rarely larger), sheaths somewhat downy with a few short bent bristles on each side of the mouth, the spathes, which are soon deciduous, are very large up to 1½ feet long, glaucous on the inside, the apex with a long fine point ; *inflorescence* when in flower it is generally destitute of leaves and as the extremity of every ramification is covered with flowers, the whole tree seems one entire immense panicle composed of innumerable somewhat verticelled spikes, each verticel being composed of several distichous oblong pointed sessile rigid spikelets which are 8-12 lines long 6-12 flowered, the fertile flowers 3-7 about the centre, the lower palea smooth at the base, nerved above, acuminate or mucronate glabrous or sometimes slightly fimbriate at the margin, the upper palea often longer, the margins inflected concave behind and fringed with hairs round the keels or margins of the concavity, scales 3 generally unequal and dissimilar, 2 broad and obtuse the 3rd lanceolate all ciliate. Stamens 6 free at the base, connective obtuse or appendiculate, style subbulbous at the base soon deeply divided into 2-3 plumose stigmas, caryopsis linear-oblong enclosed in the upper palea in size and appearance like a grain of oats. *Willd. Sp. Pl.* ii. 245 ;—*Roxb. Fl. Ind.* ii. 191. See Pl. ccxxxi.

Analysis.

1. A spikelet.
2. Two fertile florets removed from the same, the upper palea longer than the lower.
3. A fertile floret after the stamens have protruded, at the left hand side at the base can be seen a rachilla.
4. One of the upper palea perfectly glabrous and with glabrous margins, sometimes one of the margins are a little hairy.
5. A floret the lower palea removed, showing that the upper palea is very concave on the back and the edges of the concavity prominently ciliated.
6. A floret the upper palea removed, showing a lower palea (minutely ciliate on one margin), 6 free stamens, 1 style with 3 long plumose stigmas and three scales or squamulæ round the base of the ovary, these are ovate and subequal, or one is narrower than the other two.
7. Ovary and style and 1 of the stamens from a flower (before maturity), the style is hairy and appears entire not having as yet split into 3 stigmas at the apex, the stamens quite free even at the very base, ovary hairy at the apex.

8, 9. Anthers, front and back view, a small hairy apiculation at the apex.

10. Nearly ripe caryopsis (or bamboo-rice), crowned by the style and stigmas, these break off before maturity.
11. One of the scales or squamulæ. (All drawn from living specimens collected on the eastern slopes of the Nilgiris.)

For remarks on this species see notes at the head of this Order. It is called Bàns in Hindustani, Mungil in Tamil, and Vedro in Teligu. A substance called Tabaseer (a siliceous concretion) is found in the hollow culms of this and some other bamboos ; it is called Vedro pàl (bamboo milk) in Teligu, and Mungil upoo (bamboo salt) in Tamil ; it is employed to cure paralytic complaints, and as a stimulant and aphrodisiac. This bamboo is most abundant throughout this Presidency in the plains and up to elevations of 3000 feet, also in Bombay ; it occurs, I believe, also in Bengal, but there its place is generally taken by B. tulda, B. Balcoon, and B. spinosa. Long immersion in water renders bamboos much firmer ; it is also said to make them proof against attacks of the Bostrichi and their larva which so often attack them. The natives have an idea that fever is much severer in those years in which a general seeding takes place ; they however gorge themselves with the rice, which is very heating and apt to bring on both dysentery and fever.

2. Bambusa orientalis, *Nees*—I have no specimens of this bamboo ; it is said to differ from No. 1 in the rachis of the panicle being angled and slightly puberulous, and in being of a glaucous-green color ; the spikelets are submembranaceous instead of coriaceous, 7-9 lines long and 5-8 flowered, with 3-5 fertile flowers ; it has been found at Quilon and on the Nilgiris.

3. Bambusa spinosa, *Roxb.*—Culms not so hollow as in No. 1, densely cæspitose 30-50 feet high or even more ; spines at the joints and very generally present throughout the whole plant, triple, the middle one the largest and often compound, all more

or less recurved very strong and sharp, sometimes 1 or 2 absent, leaves sessile on their sheaths bifarious linear lanceolate cuspidate generally about 6 inches long sometimes pilose beneath, the sheaths ciliate at the mouth, *inflorescence*, the clump when in flower forms one immense naked panicle, the plant being leafless at that time, spikelets coriaceous often monœcious crowded on the joints of the extreme branchlets, sessile lanceolate often densely glomerato verticellate (sometimes with heads aggregated at the base of the branches and 1 inch in diameter), 5-6 lines long, 4-6 flowered, the centre 2 3 generally fertile; lower palea smooth hard and pointed, the margins fimbriate or smooth, the upper as long or longer than the lower in the male flowers but shorter in the female, concave behind, margins incurved, the edges of the cavity much ciliate, scales 3, two oval the 3rd lanceolate, ciliate. Stamens 6 free, the connective elongate, style conico-bulbous at the base soon trifid, or rarely only bifid nearly to the base. *Roxb. Fl. Ind.* ii. 199. Bambusa arundinacea, *Thw.* not *Retz*;—*Munro. Monog. p.* 105.

This species is found on the mountains on the north-eastern side of our Presidency and also in Ceylon, but I have not seen it in our western forests; it is best distinguished from arundinacea in having a paler colored more striated panicle, smaller and more coriaceous spiculæ, and fewer flowers, generally smaller leaves which are often hairy on the outside, and with the petiole sometimes much swollen at the base. In Ceylon it is called Kattoo-oonà and the seeds are eaten.

4. Bambusa vulgaris, *Wendl.*—This is the common Ceylon species called Oonà in that island; it is sometimes cultivated in India and elsewhere in the tropics; it is unarmed, the culms being intensely yellow or green or mottled green and yellow, and considerably smaller than arundinacea; the spiculæ are oblong and subcompressed looking almost as if bifid, the lower palea is rather attenuated at the base, the upper one fimbriated at the margin, the anthers are apiculated with short hairs, and the style is very different to the three last, in this it is long and simple and hirsute, divided only at the apex into 2-3 stigmas, the leaves are up to a foot long by 2 inches wide. Bambusa Thouarsii, *Kunth.*

Bambusa Balcooa, *Roxb.*, and B. tulda, *Roxb.*, common Bengal species, do not I believe occur anywhere in this Presidency. Other species inhabiting the Bengal mountains are B. nutans, *Wall*, B. teres, *Wall*, B. Falconeri, *Munro*, B. pallida, *Munro*, B. Khasiana, *Munro*, and several other species inhabit Birmah. It is highly desirable that the seeds of all the species should be freely circulated by forest officers to different Presidencies and districts. Some of our species would be valuable introductions in Bengal, and all the Bengal and Birmah species would be most valuable introductions in our Presidency. Bambusa Wightii of Munro, from Courtallum, is a Teinostachyum.

OXYTENANTHERA. Munro.

Gen. Char. Spikelets subcylindric often elongate and curved, generally few-flowered, flowers 1-3, sometimes only 1, the terminal one or the last but one 2-paleaceous and fertile, rachilla obsolete, palea very much imbricate, lower palea many-nerved acuminate or spinoso mucronate, margin glabrous or fimbriate, upper palea in the bipaleaceous fertile flowers convex on the back, keels obsolete in the other flowers bicarinate, scales none. Stamens 6 monadelphous, anthers apiculate with a mucro or bristle (often long) or with a few hairs. Style slender long or very long scarcely thickened at the base, divided at the apex into 2-3 sometimes long and plicate stigmas; caryopsis narrow linear-oblong marked with a longitudinal furrow. Arborescent or scandent reeds, spikelets aggregated in dense verticels. *Munro Monogr. p.* 126.

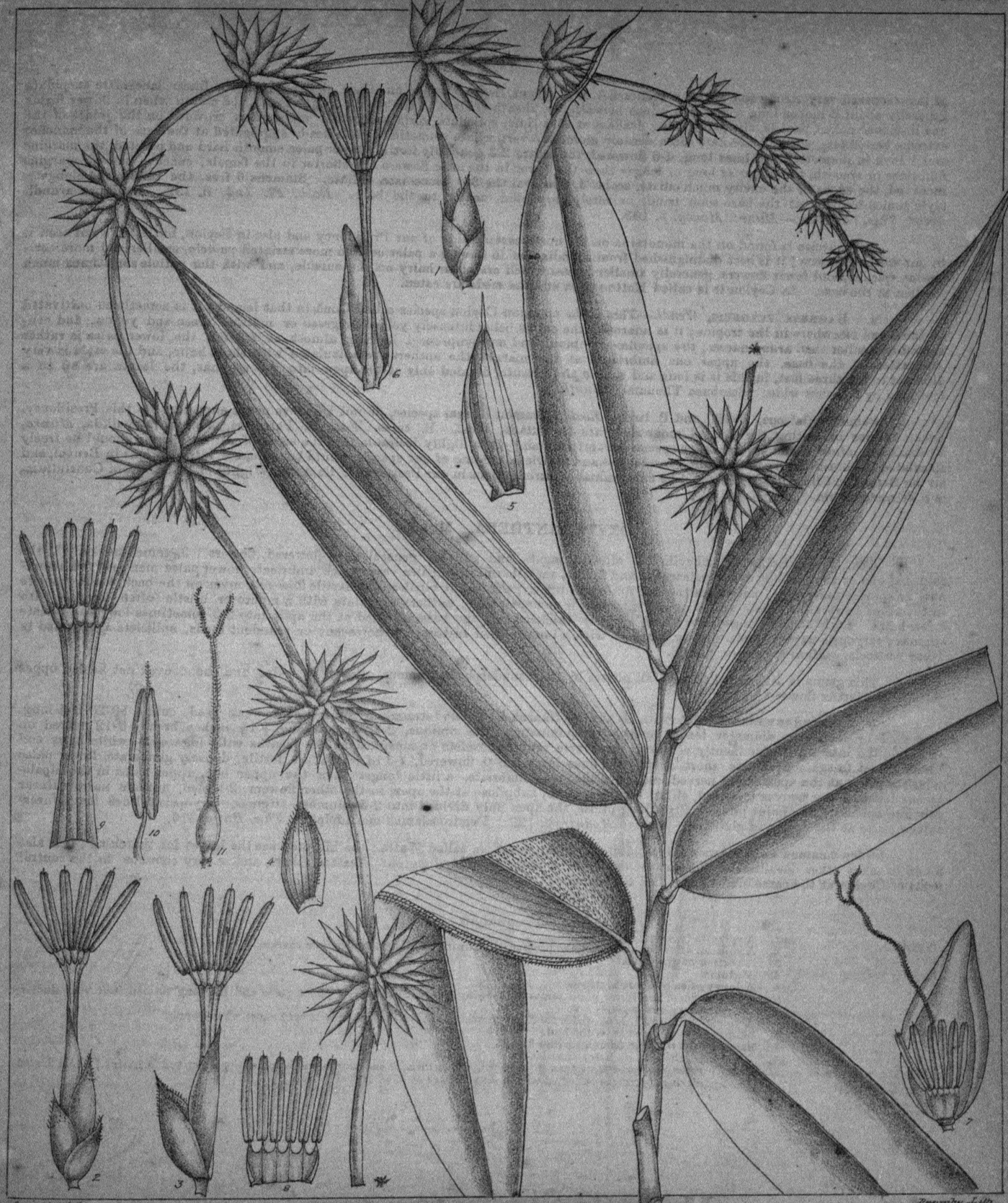
This genus is distinguished from all others by its monadelphous stamens, absence of scales, and the convex not keeled upper palea of the fertile flower.

1. Oxytenanthera Thwaitesii, *Munro.*—Unarmed, a very straggling subscandent weak reed, culms 10-20 feet long, hollow, 1-1¼ inches in diameter, leaves lanceolate acuminate a little oblique, 2-12 inches long, ½-1½ inches broad, 6-12 nerved on each side the interstices prominently venulose, transverse venules obsolete or conspicuous, the sheaths with fugaceous white hairs and ciliate except in age. Spikelets short acute 4-6 lines long 3-5-6 flowered, 1-3 of which are fertile, densely glomerate, lower palea subulato-acute at the apex 15-20 nerved, margin glabrous or fimbriate, a little longer than the upper one, upper palea in the bipaleaceous fertile flower convex 9-nerved, ciliate on the margin, subpilose at the apex, in the other flowers 2-keeled, anthers narrow linear subulato-apiculate, the point pilose. Style long pilose, the apex only divided into 2-3 plumose stigmas, caryopsis 3 lines long linear-oblong acute at the apex and glabrous. *Munro Monogr. p.* 129. Dendrocalamus monadelphus, *Thw. En. p.* 376.

Very common on the Anamallays, 3500-6000 feet elevation, called Watte; the hill men use the leaves for thatching; it is also found in many other localities in and on the outskirts of moist woods along our Western Ghats, and is very common in the central parts of Ceylon at the same elevations. See Pl. cccxxii.

Analysis.

1. A spikelet (young.)
2. A spikelet after the stamens have protruded, showing the long stamen-tube exserted.
3. A portion of the same.
4. A glume.
5. A lower palea of a fertile flower.
6. A fertile floret the lower palea removed, shewing the convex-backed upper palea and the long stamen-tube surrounding the ovary and style.
7. A young bud opened, lower palea removed shewing that the stamen-tube is very short when young.
8. Stamen tube removed from the bud.
9. Stamen tube removed from a mature flower.
10. An anther, showing its hairy apiculation.
11. Ovary hirsute, style and 2 stigmas (I never found 3, which is the number it is generally described a having) (All drawn from living specimens collected on the Anamallays at 4500 feet elevation.)



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Oxytenanthera Thwaitesii (Munro)

see Manual under Bambusea.

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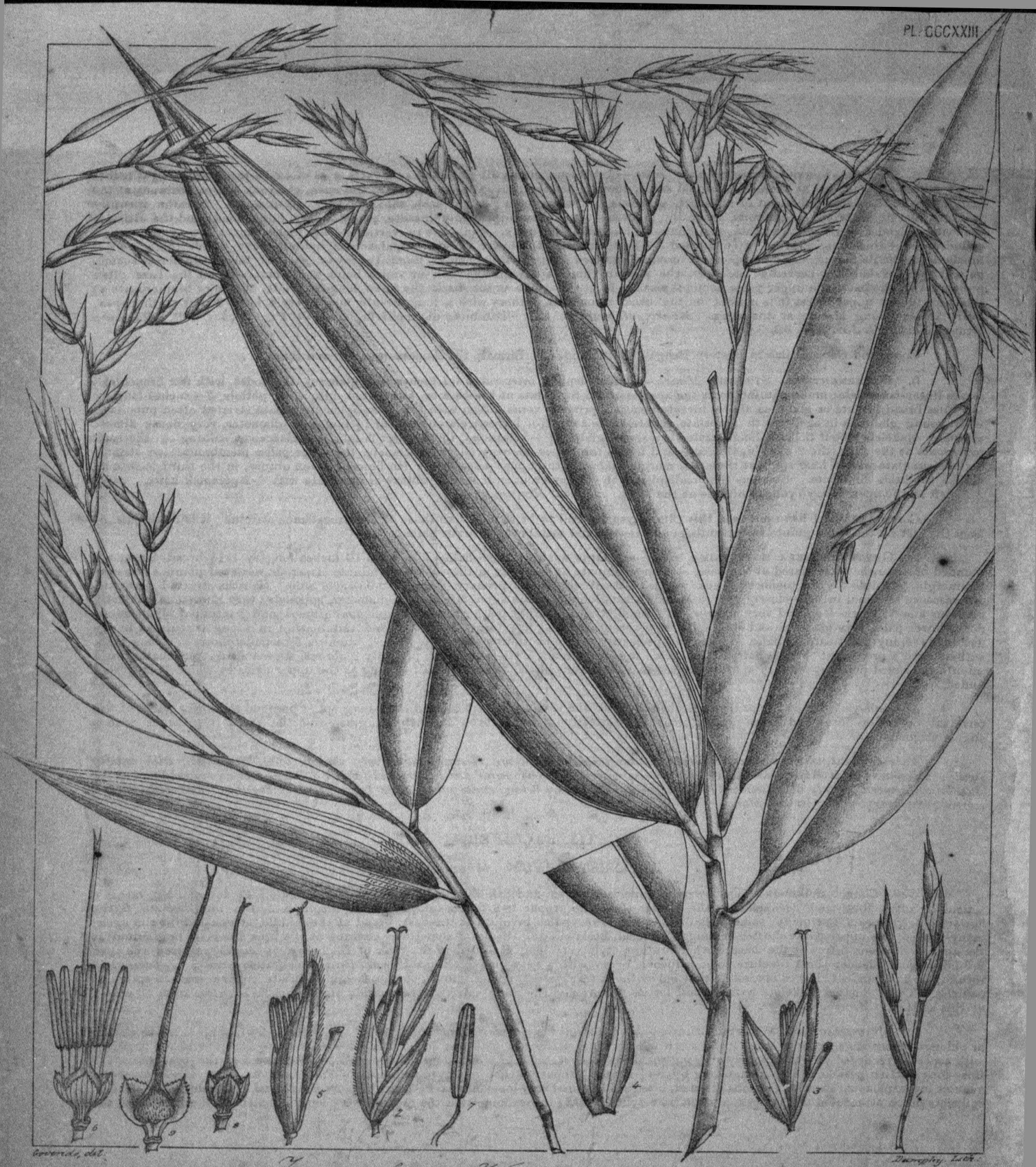


Teinostachyum Wightii (Munro)

See Manual under Bambusea.

2. Oxytenanthera nigro-ciliata, *Büse.*—Arboreous, culms 30-40 feet, leaves 7-10 or even 12-15 inches long, 1¼-2 inches broad, lanceolate rounded at the base unequal sided, shortly petioled, rostrato-acuminate at the apex, glabrous above, scabrous at the margins, paler beneath, pubescent or at length glabrous, primary veins 8-12 on each side, not very conspicuous. Sheaths abruptly truncate, margin fimbriate or glabrous, generally glabrous sometimes adpressedly hirsute, panicles very large compound the ultimate branchlets slender verticellato-spicate sometimes foliaceous at the apex. Spikelets in verticels ½-2½ inches apart, few or numerous, cylindric, 9-14 lines long narrow often curved 5-7 flowered, the 2-3 lower florets unipaleaceous neuter, above which there are 1-3 bipaleaceous fertile florets, and a conspicuous terminal exserted unipaleaceous neuter floret, the lower palea of the fertile florets acuminate or rarely subobtuse nerved at the apex, the margins fimbriate with blackish or violet hairs, membranaceous at the base often pubescent on the back, the upper palea about the same length concave at the back the keels long-fimbriate obtuse or bimucronate at the apex, in the upper floret it is convex on the back, stamens 6, anthers with a long hirsute mucro, style long 3-cleft at the apex, ovary linear-oblong hirsute at the apex. *Munro. Monogr. p.* 128. Bambusa nigro ciliata, *Büse. in Pl. Jungh.* i. 389. Bambusa bitung, *Hassk. Fl. Jav. Rar.* 42.

Coorg and Canara, also in Eastern Bengal, Chittagong, &c, Birmah, the Andamans, Java and Sumatra.

3. Oxytenanthera Stocksii, *Munro.*—Culms slender, internodes 4-7 inches long glabrous, the nodes with few branchlets, leaves linear-lanceolate mucronato-acute at the apex cordato-rotundate at the base or attenuated into a flat petiole, 3-4 inches long by 4-6 lines broad hirsute or glabrous above, hirsute beneath, primary veins 4-5 on each side inconspicuous, sheath striated often pubescent when young glabrous in age, mouth fimbriate, inflorescence as in No. 1, verticels sometimes 1¼ inches in diameter, very dense almost echinate, spikelets about 6 lines long terete very acute glabrous 4-5 flowered, the 2 lower florets unipaleaceous shining on the back mucronate at the apex, the 2 next bipaleaceous and fertile the upper one very short or obsolete, the lower palea membranaceous striato-nervose subulate with a long spine at the apex, margin glabrous, the upper palea in the 4th flower convex obtuse, in the third bicarinate obtuse, the keels fimbriate. Stamens 6 monadelphous shortly mucronate or nearly obtuse or apiculate with 1-2 greenish hairs. Style 2-3 cleft at the apex, ovary (young) hirsute at the apex. *Munro. Monogr. p.* 130.

Concan ghats. I have not seen this; its leaves are said to be exactly like those of Dendrocalamus strictus; it is distinguished from the last by the short points to the anthers and its striated membranous lower palea.

4. Oxytenanthera monostigma, *Bedd.*—A large unarmed reed, culms ? leaves 8-10 inches long by 1-1½ broad lanceolate rounded or somewhat attenuated at the base, setaceo-acuminate at the apex, glabrous except minute asperous recurved points at or near the margin (sensible to the touch but not visible without the lens), primary veins 6-8 on each side. Sheaths striated glabrous, inflorescence terminal in very closely approximated dense globular heads about 2 inches in diameter, spikelets very numerous perfectly glabrous about 1 inch long and very narrow, 2-flowered, viz. one empty palea above the 2 unequal glumes and 1 terminal bipaleaceous floret, lower palea very glabrous and shining with glabrous margins, apex much hardened and terminating in a long articulated in age deciduous spiny point, upper palea convex and perfectly glabrous shorter than the lower, stamens 6 monadelphous in a long tube, anthers with a prominent bristle hairy at its apex, squamulæ none, style and ovary perfectly glabrous, stigma entire terminating in a minute thickened point at its very apex, caryopsis narrow linear oblong, when ripe half as long as the upper palea in which it is closely folded.

Anamallays. It is at once distinguished from all the rest by the articulated very long spiny point to the lower palea of the terminal or fertile floret, the palea and glumes are perfectly glabrous even at their margins, and the style is glabrous with a simple stigma.

Another plant, which I have doubtfully under this genus in my Herbarium, is very similar to O. Thwaitesii, with exactly similar spikelets, but is either quite abnormal or else entirely a new genus; it has monadelphous stamens and no squamulæ, but the stamens are generally only 3, sometimes 4-5 never 6, and there are 3 long styles either quite free or twisted together, each with a bifid stigma; the ovary is long linear oblong.

SEC. III. BACCIFERÆ.

TEINOSTACHYUM. Munro.

Gen. Char. Spikelets many-flowered imperfect above and below, cylindric attenuated elongate 1-2½ inches long, rachillæ articulate often long and conspicuous, the lower 1-2, the upper 2-4 florets unipaleaceous incomplete, the intermediate fertile flowers 3-5, glumes 2-3 or many sometimes distant, the lower palea involute at the base, broad at the middle, attenuated at the apex, many-nerved, the upper palea shorter or longer 2-keeled, keels ciliate. Scales 3 sometimes concave at the base fimbriate or glabrous at the apex. Stamens 6 free at the base, anthers obtuse, style very long included in the beak of the ovary, at length exserted, the apex 2-3-fid, stigmas slender short revolute soon caducous, ovary with a very long attenuated beak, fruit bacciform rostrate. Arboreous or shrubby or subscandent, leaves lanceolate petioled without transverse venules, mouth of the sheath fimbriate, inflorescence in spikes or panicles. The elongated spikelets with several fertile flowers and the long joints of the rachilla distinguish this genus from all others of this section. *Munro. Monogr. p.* 142.

1. Teinostachyum Wightii, *Munro.*—A very large weak reed, culms subarboreous suberect, 12-20 feet high, leaves oblong or oblongo-lanceolate sparingly hairy underneath when young, at length glabrous on both sides, more or less scabrous at the margins with asperous recurved points, apex with a long scabrous almost setaceous acumination rounded or attenuated at the base into a 4-9 lines long flattish petiole, 10-20 inches long by 2-4¼ broad, primary veins rather prominent beneath, 6-15 on each side, transverse venules inconspicuous, sheaths glabrous striated, branches terminal very long and lax 1½-2 feet or more pendulous, branchlets very slender, spikelets much attenuated at the apex, very narrow cylindric 2-2½ inches long with the rachillæ very long and slender, lower palea of the

fertile florets many-nerved hirsute on the back, upper palea a little longer obtuse convex on the back with the keels hirsute, scales 3 equa large ovate nervose fimbriate, stamens 6 free at the base, anthers obtuse, style long included in the glabrous beak of the perigynium, stigmas 2 at length exserted and revolute, ovary with a long beak, caryopsis glabrous with a short stalk and a very long beak. Bambusa Wightii, *Munro. Mongr. p.* 111.—See Plate cccxxiii.

Common on our western mountains up to 3-4000 feet elevation.

Analysis.

1. A spikelet.
2. A portion of the same, shewing a fertile floret and a neuter flower with its rachilla.
3. A fertile floret and the articulated rachilla, off which the neuter flower has dropped.
4. The nerved lower palea hispid down the back, the apex much acuminate.
5. A fertile floret, the lower palea removed to shew the upper obtuse palea convex on its back, the keels ciliate.
6. A fertile floret, both paleæ removed to shew the 6 free stamens and the 3 ovate fimbriate scales.
7. An anther.
8. Ovary and style, and the scales.
9. Mature fruit, showing the short stalk at its base. (All drawn from living species collected on the west slope of the Nilgiris, 1000 feet elevation.)

2. Teinostachyum attenuatum, *Thw.*—Culms 15-25 feet high, ½-1 inch in diameter, unarmed, leaves 3-6 inches long 4-9 lines broad nervoso-striate glabrous linear lanceolate subabruptly acuminate, rounded at the base, petioled, the sheaths sparingly adpresso-pilose, flowering branches fasciculate rather short leafy, panicles simple spiciform, spikelets about 1 inch long glabrous subsessile congested in small fascicles narrow attenuato-cylindric 5-flowered, the 2 upper and the lowest flowers generally sterile, scales 3 lanceolate fimbriate at the apex, the lower palea 12-nerved glabrous acute mucronate a little longer than the upper one, the upper palea 2-keeled, the keels fimbriate above, style elongate thickened below the middle. Stigmas 3 plumose much shorter than the style, stamens 6 free the mucro of the anthers very small obtuse, fruit rostrate attenuate at both ends glabrous with the beak 4½ lines long. Bambusa attenuata, *Thw. En. Pl. p.* 375. Teinostachyum, *Munro.*

Ceylon, central provinces, 4000 6000 feet elevation.

BEESHA. Rheede.

Gen. Char. Spikelets imperfect at both ends, monœcious (always) cylindric many or few-flowered, the lower florets unipaleaceous and neuter, the penultimate one bipaleaceous and hermathrodite, the upper floret minute rudimentary or sometimes obsolete, glumes 2, the lower palea of the fertile flower many-nerved membranaceous glabrous or setose on the back, the upper palea generally longer obtuse or bimucronate at the apex. Scales 3-6-or numerous. Stamens 6-9 or very numerous, style long the apex divided into 3-4-5 stigmas. Fruit large ovoid or oblong acuminated with a long beak. Arboreous or shrubby, leaves large or small, inflorescence generally terminal either laxly verticellato-spicate or the spikelets congested in heads at the apex of the branches. *Rheede Hort. Mal.* v. 119. *t.* 60;—*Munro. Monogr. p.* 144. Ochlandra, *Thw. En. Pl. Zey.* 376.

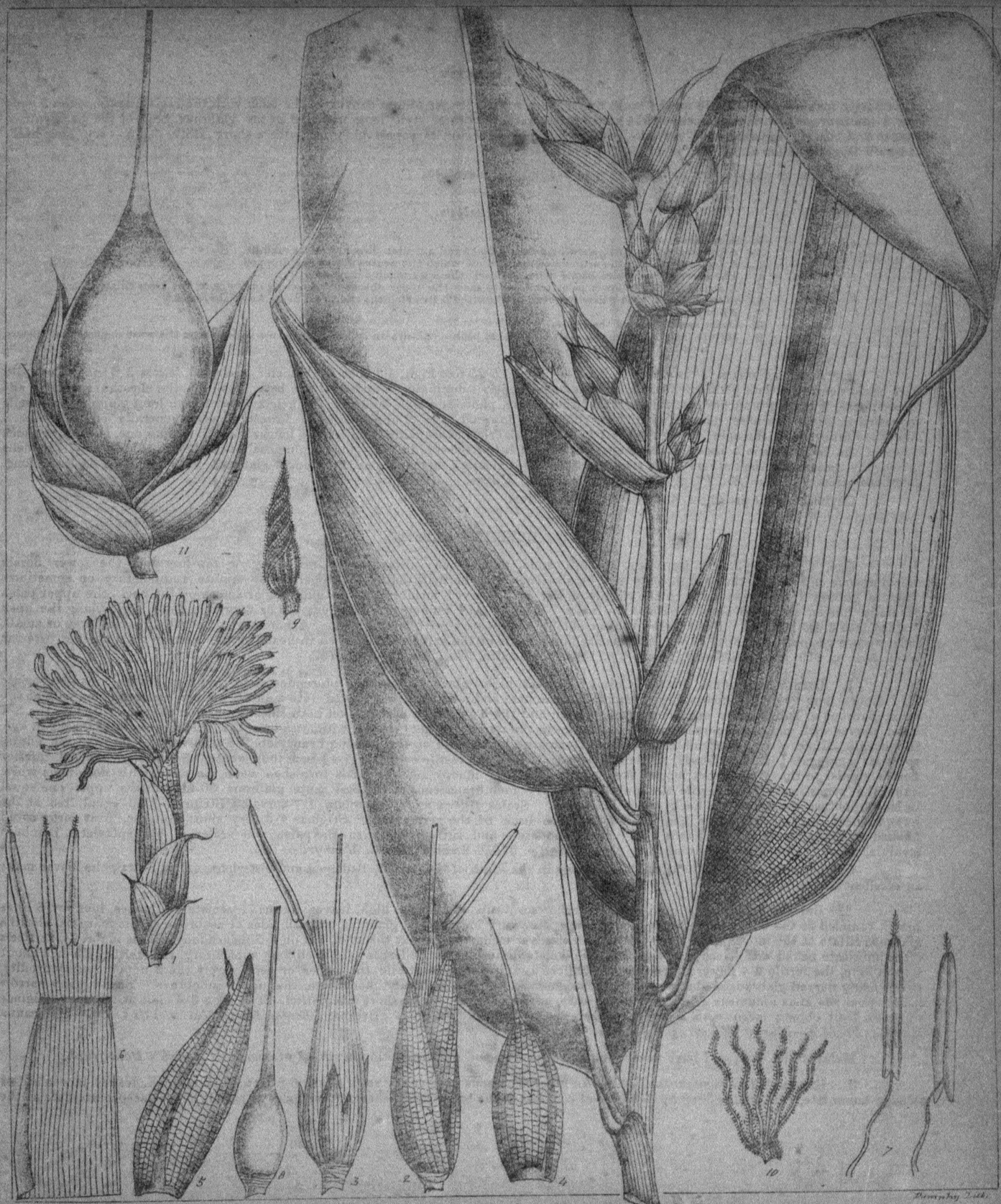
1. Beesha stridula, *Moon.*—Culms 6-18 feet high suberect crowded, internodes often scabrous, leaves broad-lanceolate 8-12 inches long by 1¼-1¾ inches broad rounded at the base and suddenly attenuated into a short petiole, setaceo-acuminate at the apex, glabrous or subglabrous except near the margin and there generally asperous on both sides or only on the upper side on the 3-4 outer nerves with minute recurved prickles sensible to the touch but not visible without a lens, the sheath hirsute glabrous in age, the margin ciliate often biauriculate, panicles laxly spicate terminal or on leaf-bearing branchlets 2-5 semi-verticellate from the joints, spikelets aggregated in small heads, fertile and sterile mixed, the fertile cylindric 1-1¼ inch long acute 3-5 flowered, the 1-2 inferior florets similar to the glumes but longer, the apex with a long mucro and the back furnished near the apex with deciduous white hairs, the penultimate floret fertile the lower palea very membranaceous at the base acute glabrous 30-nerved, the upper one equal in length obtuse convex on the back about 18 nerved. Scales 6-9 or more lanceolate 1-7-nerved. Stamens 7-30 equal free at the base, anthers mucronulate, style long included in the beak of the perigynium. Stigmas 4-5 very short plumose, fruit large ovoid beaked with the hardened persistent 1½-2 inches long style and surrounded with the palea and scales of the spikelet. Bambusa stridula, *Moon.* Ochlandra stridula, *Thw. En. Pl. Zey. p.* 376. Beesha, *Munro. Monogr. p.* 145.

Ceylon, very common about the low country in the south of the island, Badagam and elsewhere, called Batta; the leaves make an excellent thatch.

2. Beesha Rheedii, *Kunth.*—Culms arborescent up to 16 feet high, leaves lineari-lanceolate 4-5 inches long by 6 lines broad, rounded at the base and petiolate, acuminate with a very long bristle, glabrous on both sides or scabrous at the margins, sheaths glabrous ciliate at the mouth, ligula very short, panicles verticellato-spicate at the apex, 1-2 or 4-5 inches long, rachis glabrous, verticels often imbricate naked or foliaceous at the base. Spikelets dimorphous, the fertile 1-1½ inch long subsolitary, the sterile cylindric about 9 lines long, the fertile 3-4 flowered, the lower 1-2 florets unipaleaceous sterile, the upper or very rarely the 2 upper hermathrodite, paleæ many nerved glabrous or hirsute membranaceous, the inferior suddenly mucronate, the upper subobtuse. Scales many narrow fimbriate at the apex; stamens 15-18 free at the base, anthers with a long or short apiculation. Style long 3-4 cleft at the apex, stigmas plumose, fruit oblong large with a beak 1¾ inch long. *Kunth. En.* 434. Beesha, *Rheede. Hort. Mal.* v. 119 *t.* 60. Melocanna Rheedii, *Steud.*;—*Munro. Monogr. p.* 144.

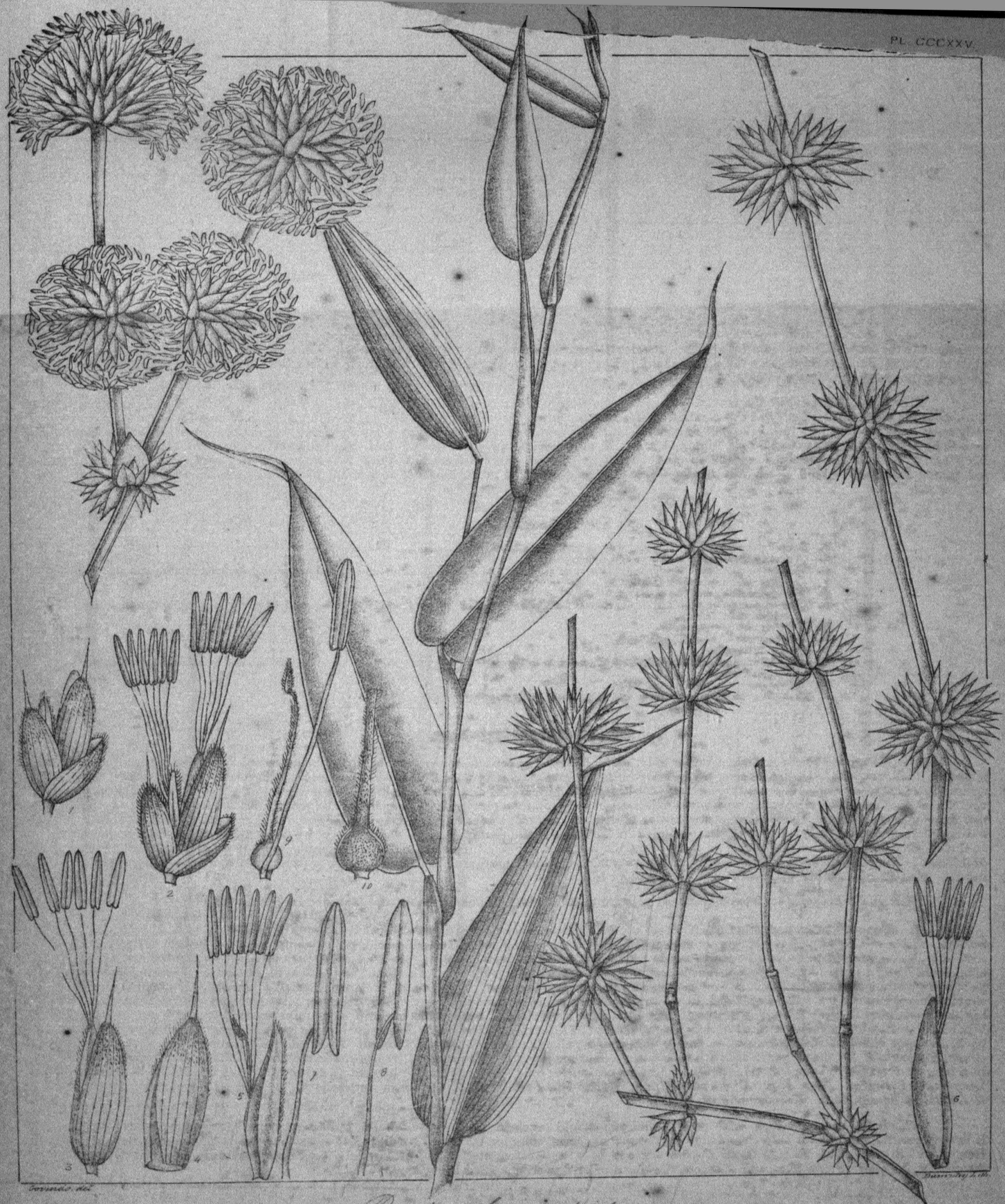
Malabar and Cochin, I have never found this species, and my description is entirely taken from Munro's *Monograph.*

3. Beesha ? Travancorica, *Bedd.*—An erect arboreous or shrubby reed, culms 6-8 feet or more high, leaves lanceolate or oblongo-lanceolate, 7-18 inches long by 2-4½ broad rounded at the base with a short rather concave petiole long setaceo-acuminate at the



Beesha Travancorica. Bedd.

See Manual under Rumbusea



Dendrocalamus strictus.

*See Manual under Bambusea

apex, glabrous or subglabrous on both sides but the margins generally scabrous with minute prickly points, primary veins 12-17 on each side, tesellated, transverse venules prominent beneath, sheaths striated glabrous, the mouth generally ciliate when young but beardless in age, ligula short truncate, panicles verticellato-spicate, spikelets ovate or oblongo-ovate 2-2½ inches long quite glabrous or rather softly pubescent generally 4-flowered, the two upper florets hermathrodite, the two lower unipaleaceous, sterile, the outer palea many striated and with transverse venules, generally with a very long sudden acumination or shortly acuminated glabrous or softly pubescent coriaceous or submembranaceous, the upper palea obtuse very membranaceous striated and with transverse venules. Stamens numerous 50-60 monadelphous at the base at first shortly so, but the tube soon lengthens, anthers with a hirsute apiculation. Style long, stigmas 6 small plumose spirally twisted closely enveloped in the apex of the upper palea very soon deciduous leaving the style with a truncate apex as it is thrust out from the upper palea. Scales 3 lanceolate unequal one of them generally bifid all very membranaceous, fruit oblong or ovate fleshy embraced by the palea about 1½ inches in diameter and 2-2¼ inches long with a hard beak about 2 inches long. Irulia Travancorica, *Bedd. in Distrib.*

This magnificent species is most abundant on the South Travancore and South Tinnevelly mountains, 3000-5500 feet elevation, where it covers many miles of the mountains often to the entire exclusion of all other vegetation ; in open mountain tracts it generally only grows to 6-8 feet in height, but most close and impenetrable, elephants even not attempting to get through it ; inside sholas and their outskirts it grows to 15 feet high and is much more straggling. It is called Irul by all the natives, and by Europeans the Elephant grass ; its monadelphous stamens and curiously twisted stigmas seem to require its removal from Beesha, in which case my genus Irulia will stand good. Not having seen Beesha Rheedii, I prefer however at present to let this remain in Beesha. See Pl. cccxxiv.

Analysis.

1. A spikelet after the anthers of the upper flowers have burst forth.
2. A fertile floret with its lower and upper paleæ.
3. The same the 2 paleæ removed, 3 scales or squamulæ (one of them bifid), and the long stamen-tube, and the truncated style, the stigmas having fallen off.
4. The palea of one of the neuter flowers.
5. The upper palea of a fertile floret when only in bud, the stigmas artificially removed from its apex in which they are almost folded up.
6. Portion of a stamen tube.
7. Anthers with their apiculations.
8. Ovary and style.
9. Highly magnified views of the 6 plumose spirally twisted stigmas ; they are so closely twisted as to appear as one to the naked eye.
10. The same opened out artificially.
11. A fruit with its long hard beak. (Drawn from flowers in spirits.)

DENDROCALAMUS. Nees.

Gen. Char. Spikelets imperfect below only, or both in the upper and lower part, ovate or oblong or oval acute or obtuse few-or many-flowered, rachilla wanting, florets 1-2 inferior unipaleaceous, the next 2 or 3 or several bipaleaceous hermathrodite or female, the terminal one effete or altogether wanting, glumes 2-3 the upper one keeled and the keel ciliate, the lower palea many-nerved generally ventricose chartaceous or membranaceous often subulate or spinoso-mucronate at the apex, the back glabrous or hirsute or sericeous, the margin glabrous or ciliate, the upper palea narrower obtuse few-nerved, scales none. Stamens 6 free at the base, anthers obtuse or with a long hirsute mucro. Style long filiform included in the beak of the perigynium, stigma entire plumose or 2-3-cleft, ovary hirsute at at the apex rostrate the beak persistent or caducous, fruit bacciform oblong hirsute at the apex generally rostrate or the beak sometimes deciduous. Aborescent or shrubby bamboos, always unarmed, leaves narrow or broad, inflorescence paniculate, spikelets congested in heads. *Nees in Linnæa* ix. 476 ;—*Munro Monogr. p.* 146.

This genus only differs from Bambusa in its fruit and in the absence of scales or squamulæ in the flower.

1. Dendrocalamus strictus, *Nees.*—Culms unarmed arboreous up to 40-50 feet high, nearly solid or with a very small cavity. Spathes striated yellowish very smooth inside, 8-10 inches long with an adpressed glabrous apiculation, internodes about a foot long, leaves lanceolate with a long apiculation rounded or rarely attenuate at the base, the petiole short or sometimes much elongated, 1½-12 inches long by ½-1½ inches broad, above asperous or hirsute, beneath hirsute or at length glabrous. Sheaths hirsute viscid or glabrous the mouth with a few caducous bristles or beardless, ligula short truncate, panicles branched, branchlets terete simple elongate never pendulous, spikelets in dense globular verticelled heads which are 1-2 inches in diameter and entirely surrounding the branches, ovate or oblong, 3-9 lines long generally very acute, 1-2 of the lower florets unipaleaceous, the 2-3 upper ones bipaleaceous and hermathrodite, the lower palea (of the fertile flower) ventricose subcoriaceous hirsute or pubescent or velvetty on the back, the apex subulate with a long spiny point, the upper palea narrower obtuse pubescent 2-keeled and concave at the back, keels ciliate, 2-4 nerved, (in the upper floret with a convex glabrous back.) Stamens 6, free, connective not produced (or terminating in a long mucro.) Style long hirsute. Stigma plumose entire, (or bifid ?) ovary rostrate hirsute at the apex, fruit bacciform 3-4 lines long ovate rostrate. *Nees. l. c.* Bambusa stricta, *Roxb. Fl. Ind.* ii. 193. Bambusa verticellata, *Rottler.* B. pubescens, *Lodd. et Lindl. in Penny. Cyc.* Nastus strictus, *Smith.*

This is the male Bamboo, with nearly solid stems, and much in use for spear-shafts, building purposes, and many other uses ; it is very general throughout this Presidency on the dry slopes of our mountains up to 3000 feet elevation, and is common in Bombay, Bengal and Birmah, but absent from Ceylon (except in a cultivated state), and it extends to Singapore and Java ; it flowers frequently, I believe every year, and does not die down after flowering. See Pl. cccxxv.

Analysis.

1. A spikelet in bud, one unipalcaceous neuter floret below, two fertile florets above.
2. The same at maturity, the stamens exserted, the lower of the 2 fertile flowers with a 2 keeled concave upper palea and the upper fertile floret with a convex glabrous upper palea.
3. The lower of the 2 fertile florets.
4. The lower palea many nerved, very hairy towards the apex, terminating in a long sharp spiny acumination.
5. The lower fertile floret with the lower palea removed to show the 2 keeled convex upper paleæ, its keels ciliate; the 6 free stamens and the style with an entire stigma (it is generally described as bifid, but in upwards of 20 florets dissected, I found it always entire.)
6. The upper fertile floret, lower palea removed to show that the upper palea is convex, and smooth (except just at its apex.)
7, 8. Anthers.
9. The stalked ovary, hairy style, and entire stigma, and one of the 6 free stamens.
10. Fruit nearly mature. (All drawn from living specimens collected on the eastern slopes of the Nilgiris.)

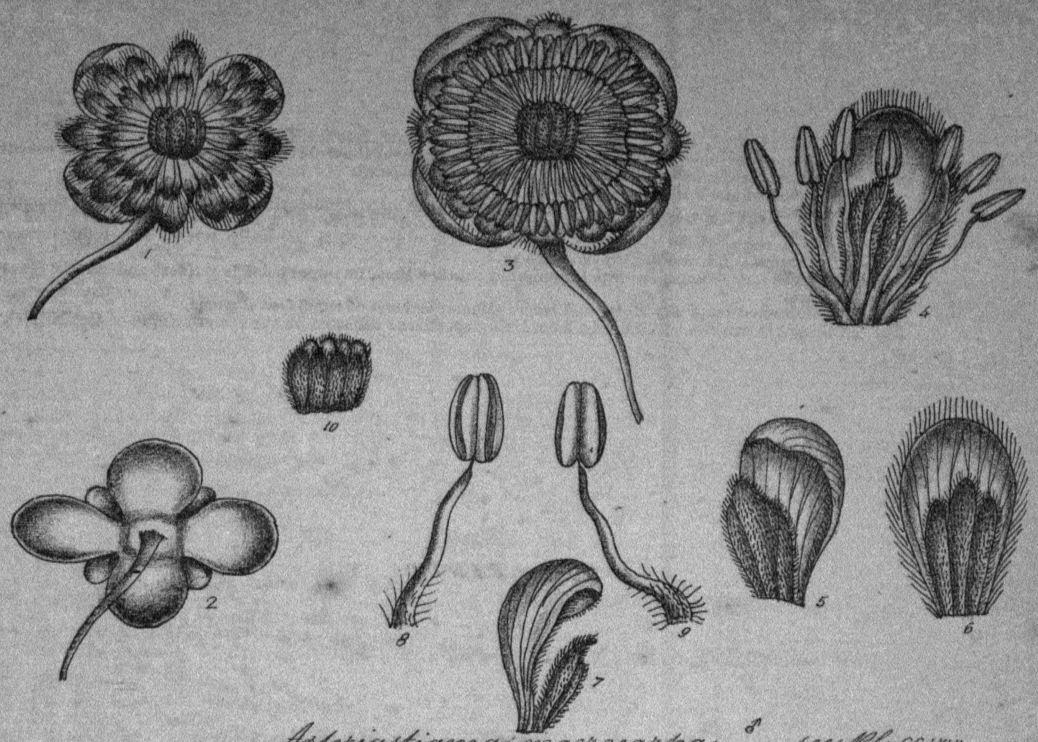
FINIS.

Analysis of Genera, Pl. XXVIII, fig. 1.

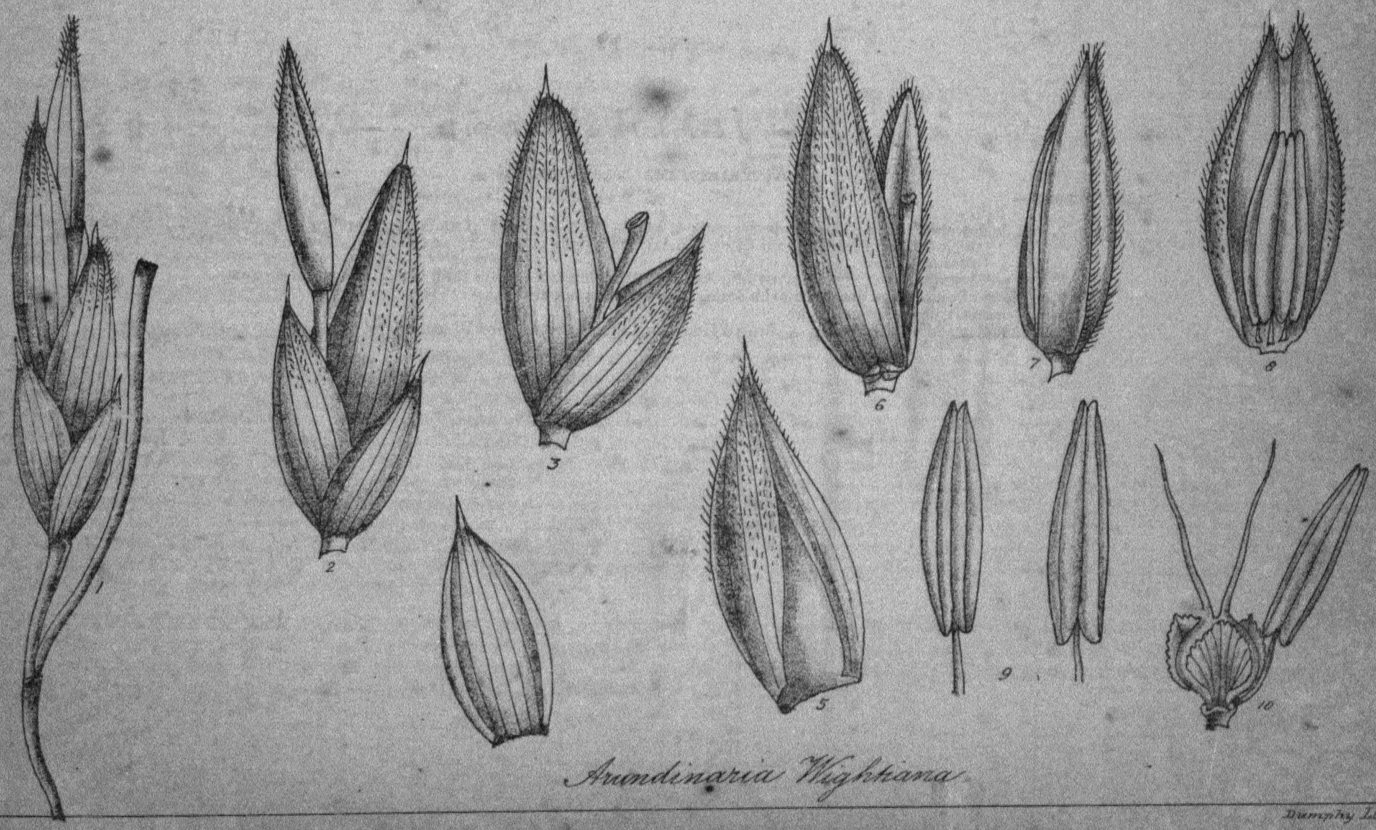
ASTERIASTIGMA MACROCARPA.

Male flowers—

1, 2, 3. Male flowers, front and back view, sepals 4, petals 16, 3 in front of each sepal and one alternate with each of the sepals, a thick 3-lobed scale in front of each petal and somewhat adnate at the base, stamens about 70 in 3 rows, rudiment of ovary 8-lobed.
4. A petal and some of the stamens removed from the flower to show that the latter are in 3 rows.
5, 6, 7. Views of one of the petals and the scale, the former much ciliate.
8, 9. Stamens, front and back view.
10. The abortive 8-lobed ovary. (Drawn from flowers in spirits. See Pl. cclxvi.)



Asteriastigma macrocarpa 8 see Pl. CCLXVI.



Arundinaria Wightiana

Dumphy Lith.

ORDER XLVI.—RUBIACEÆ.

Calyx-tube adnate to the ovary; the limb entire or with as many teeth lobes or divisions as lobes of the corolla, rarely more, fewer or none. Corolla gamopetalous, inserted round the epigynous disk, lobes 4, 5 or sometimes more, rarely only 3, either imbricate (often contorted) or valvate in the bud. Stamens as many as lobes of the corolla, alternating with them and inserted in the tube, anthers various generally oblong linear 2-celled, the cells opening longitudinally or rarely by pores at the apex, fixed at the back or base or versatile. Ovary inferior, 2-or more-celled, with 1 or more ovules in each cell, rarely 1-celled with parietal placentas, or reduced to one 1-ovulate cell; style more or less divided into as many stigmatic lobes as carpels to the gynœcium, or undivided with a thickened entire or notched stigma. Fruit a capsule, drupe, berry, or indehiscent nut. Seeds with a fleshy or horny or ruminate albumen, and rather small straight, embryo with flat cotyledons, or rarely with little or no albumen and cylindrical embryo with semiterete cotyledons. Trees, shrubs, herbs, or rarely climbers. Leaves opposite or whorled. Stipules interpetiolar, either free or connate with the petioles in a sheath bordered by cilia or leaf-like lobes, or with one or two points on each side, or connate within the petioles in a short sheath or ring round the stem. Inflorescence various, usually more or less cymose, axillary or terminal. Flowers occasionally polygamous or unisexual.

A very large order, and one of considerable importance to the forester. The old genus Nauclea yields valuable timbers; this genus is now divided into 5, viz., Sarcocephalus yielding 1 tree common in Ceylon, but not found in the peninsula; Anthocephalus 1 tree, India and Ceylon; Adina 1 tree (A. cordifolia) throughout this presidency; Stephegyne 2 trees, 1 confined to Ceylon, 1 (S. parvifolia) common throughout the dry forests of this presidency; and Nauclea, several trees both in India and Ceylon. The genus Hymenodictyon also yields several valuable timber trees found on both sides of the Presidency.

Wendlandia, Morinda, Plectronia, (better known hitherto as Canthium) and Ixora yield timber trees of fair quality, and are found throughout the presidency. Diplospora are trees confined to our western forests and Ceylon.

Nargedia (a shrub); Uncaria (a creeping shrub); Urophyllum (2 small trees); Scyphostachys (2 shrubs); Timonius (a small tree); Dichilanthe (a tree); and Prismatomeris (2 shrubs) are genera confined to Ceylon.—Byrsophyllum, 2 small trees, one confined to Ceylon, the other to the Travancore and Tinnevelly mountains.—Mussænda, Randia, Webera, Gardenia, Pavetta, Coffea, Psychotria and Hamiltonia are generally shrubs, rarely small trees, found throughout the Presidency.

Saprosma and Lasianthus are shrubs confined to our western moist forests (1 species of the latter is found in moist localities on the higher mountains on the N. East side), and with many species of Psychotria, Pavetta and Ixora are very characteristic of these forests.

There are very few genera in Northern India which are not represented in our Peninsular flora. In Naucleæ, the genus Cephalanthus is represented by a tree on the Himalayas. In Cinchoneæ the genus Luculia yields 2 shrubs. In Gardenieæ the genera Brachytome, Petunga and Hyptianthera are represented by shrubs. In Vangueriea the genus Vangueria (scarcely distinct from Plectronia) yields 1 shrub. The Morindeæ Damnacanthus 1 shrub, and in Pœderieæ the genus Leptodermis yields several shrubs.

Herbs and undershrubs are largely represented, particularly in our moist mountain forests.

In Hedyotideæ (a tribe not represented by trees or shrubs) the following genera occur in S. India.—Dentella, Argostemma, Neurocalyx, Hedyotis, Oldenlandia, Anotis and Ophiorhiza. And the following are confined to Northern India, Spiradiclis, Polyura, Carlemannia and Silvianthus.

In Mussændeæ, Acranthera, Leucocodon, Schizostigma and Adenosacme (Lawia, Wight) occur in South India or Ceylon, and in N. India Polysenia and Myrioneuron.

In Knoxieæ (not represented by trees or shrubs) Knoxia.

In Psychotrieæ, Chasalia, Geophila, Allæophania and Fergusonia.

In Pœderieæ, Pœderia.

In Spermacoceæ (not otherwise represented) Hydrophylax, and Spermacoce.

In Galieæ (not otherwise represented) Rubia and Galium.

In Cinchoneæ, Hymenopogon is a N. Indian genus yielding epiphytic plants.

The Coffee, Coffea Arabica and the Peruvian bark, Cinchona (various species), are introductions into this presidency, but there are numerous plantations formed of both on our mountains, the former generally between 2 and 4000 feet elevation, the latter between 3 and 8000 feet.

The Ipecacuhana Cephælis, belonging to the Psychotrieæ, has also been introduced, but without much success as yet; it would probably answer well on the moist western slopes of the Nilgiris at 3000-4000 feet elevation.

CONSPECTUS OF THE TRIBES.

Series A.—Ovules numerous in each cell of the ovary.

* Fruit dry capsular, or with 2-4 cocci or nucamentaceous.

1. Flowers in a globose head.

Tribe I, NAUCLEÆ. Corol narrow infundibuliform never contorted. Stigma entire much exserted.

2. Flowers not in globose heads.

Tribe II, CINCHONEÆ. Corol valvate imbricate or contorted. Capsule 2-celled, seed winged or appendiculate, albuminous.

Tribe III, RONDELETIEÆ. Corol imbricate or contorted. Capsule 2-celled, seed very numerous albuminous, not winged.

* * Fruit fleshy splitting irregularly or dehiscing at the apex, or a drupe with 2-many pyrenes, each many-seeded

Tribe IV, MUSSÆNDEÆ. Corol valvate. Seed numerous minute angled.

Tribe V, GARDENIEÆ. Corol much contorted. Seed numerous or few large compressed or small and angled.

Series B.—Ovules 2 in each cell collateral.

Tribe VI, RETINIPHYLLEÆ. Corol contorted, drupe with 5-7 pyrenes.

Series C.—Ovules solitary, in the cells. Or sometimes twin in one genus in Morindeæ.

* Radicle superior.

Tribe VII, GUETTARDEÆ. Corol imbricate or valvate, stamens inserted in the jaws of the corol, seed with a thickened funicle, albumen none or scanty.

Tribe VIII, VANGUERIEÆ. Corol valvate, stamens inserted in the jaws of the corol. Seed albuminous.

Radicle inferior.

1. Corol contorted.

Tribe IX, IXOREÆ. Ovary 2-4-celled, ovules attached to the middle or below the middle of the axis, generally amphitropal or semianatropal, rarely basal.

2. Corol valvate (sub imbricate in one genus in Morindeæ.)

† Ovules attached to the partition, rarely basal, generally amphitropal.

Tribe X, MORINDEÆ. Ovary 2-4-celled.

†† Ovules basal erect anatropal.

Tribe XI, PSYCHOTRIEÆ. Stamens inserted in the jaws of the corol. Ovary 2-many-celled, stigma entire or the style-branches short, fruit indehiscent.

Tribe XII, PÆDERIEÆ. Stamens inserted in the jaws, or rarely at the base of the corol, ovary 2-5 celled, style-branches filiform, fruit capsular or with 2-cocci.

Series D.—Ovary 1-celled, ovules 1-2 pendulous.

Tribe XIII, OCTOTROPIDEÆ.

CONSPECTUS OF THE GENERA.

Tribe I.—NAUCLEÆ.

Calyx-tubes confluent, fruit syncarpous globose.
- Ovary 2-celled ..... SARCOCEPHALUS.
- Ovary 4-celled above, 2-celled below, placentas bifid above ..... ANTHOCEPHALUS.

Calyx-tubes contiguous or slightly cohering, fruit capsular.
- Corol valvate.
  - Calyx limb 5-lobed, placentas pendulous. Trees ..... ADINA.
  - Calyx cup-shaped or tubular truncate or obscurely 5-toothed, placentas pendulous. Trees. ..... STEPHEGYNE.
  - Placentas prominent attached to the partition, the ovules ascending, scandent shrubs ..... UNCARIA.
- Corol imbricate ..... NAUCLEA.

Tribe II.—CINCHONEÆ.

HYMENODYCTION.

Tribe III.—RONDELETIEÆ.

WENDLANDIA.

Tribe IV.—MUSSÆNDEÆ.

Inflorescence terminal. Corol-tube elongate ..... MUSSENDA.
Inflorescence axillary. Corol tube short ..... UROPHYLLUM.

Tribe V.—GARDENIÆ.

Flowers hermathrodite.
- Ovary 2-celled.
  - Albumen not ruminate.
    - Stamens 5 ovules imbedded in a fleshy placenta, inflorescence generally axillary ..... RANDIA.

Stamens 5-9, ovules not imbedded in the placenta, inflorescence generally terminal . ... WEBERA.
Stamens 4, flowers in axillary spikes .. .. SCYPHONTACHYS.
Albumen ruminate ... ... NARGEDIA.
Ovary 1-celled... ... ... GARDENIA.
Flowers diœcious or polygamo-diœcious.
Inflorescence terminal large, stipules large convolute deciduous ... ... BYRSOPHYLLUM.
Inflorescence axillary small, stipules not convolute .. .. DIPLOSPORA.

Tribe VI.—RETINIPHYLLEÆ.

SCYPHIPHORA.

Tribe VII.—GUETTARDEÆ.

Corol regularly imbricate, 2-3 lobes exterior ... . GUETTARDA.
Corol valvate or subimbricate.
Corol not bilabiate, drupe with many pyrenes ... . TIMONIUS.
Corol bilabiate, tube curved, fruit 2-celled ... ... DICHILANTHE.

Tribe VIII.—VANGUERIEÆ.

PLECTRONIA.

Tribe IX.—IXOREÆ.

Style entire or the style branches erect and connivent ... ... PAVETTA.
Style bifid at the top the lobes spreading or recurved.
Pyrenes plane and concave on the inner face ... ... IXORA.
Pyrenes scored with a deep furrow on the inner face. ... ... COFFEA.

Tribe X.—MORINDEÆ.

Flowers confluent in heads, fruit syncarpous ... ... MORINDA.
Flowers not confluent in heads, fruit pisiform ... ... PRISMATOMERIS.

Tribe XI.—PSYCHOTRIEÆ.

Style-branches or stigmas 2.
Corol simply valvate, stamens 5-(rarely 4-6)... ... ... PSYCHOTRIA.
Corol induplicate-valvate, stamens 4 ... ... SAPROSMA.
Style-branches 4-9 ... ... LASIANTHUS.

Tribe XII.—PÆDERIEÆ.

HAMILTONIA.

Tribe XIII.—OCTOTROPIDIEÆ.

OCTOTROPIS.

Tribe I, NAUCLEA.—*Flowers numerous, densely crowded on a spherical receptacle sessile or pedicelled. Corol narrow infundibuliform the tube elongate, lobes short imbricate or valvate, anthers inserted in the mouth or jaws of the corol generally subsessile short acute or apiculate, ovary 2-celled. Style much exserted, stigma clavate fusiform or capitate, ovules numerous rarely solitary (in Cephalanthus not a South Indian genus) fruit syncarpous many-celled, or a capsule septicidally 2-valved or with 2 cocci. Seed minute winged or wingless albuminous, radicle superior.*

SARCOCEPHALUS. AFZEL.

For Gen. Char. see letter-press to Pl. cccxviii.

N. B.—In description, for " seed sessile connate," &c., read *seed-vessels connate.*

1. SARCOCEPHALUS CORDATUS, *Roxb.*—For description, &c. see Pl. cccxviii.

ANTHOCEPHALUS. A. RICH.

Gen. Char. Flowers compact in a globose head without bracteoles, the calyxes concrete, calyx-tube obconical, lobes 5 spathulate or oblong persistent or deciduous, corol tubuloso-infundibuliform glabrous at the jaws, the lobes 5 imbricate 1 or 2 exterior. Stamens 5 inserted into the jaws of the corol, filaments short flat, anthers ovato-oblong apiculate, disk inconspicuous, ovary 2-celled below, 4-celled above, the placenta adnate to the partition below bifid above, the divisions ascending between the cells. Style filiform exserted, stigma fusiform, ovules numerous subhorizontal anatropal, fruit syncarpous subfleshy, pyrenes numerous membranaceous at the base above 4-locellate below 2-celled, few-seeded. Seed minute ellipsoid, funicle very short, testa submembranaceous netted, albumen fleshy, embryo clavate, cotyledons short, radicle obtuse Trees, glabrous, leaves opposite petiolate coriaceous, stipules large or elongate caducous, flower heads shortly peduncled terminal without bracts, flowers orange-colored. *A. Rich. in Mem. Soc. Hist. Nat. Par. V.* 237 ;—*Benth. et Hook. Gen. Pl. vol* ii. *p.* 29. Nauclea Sp., *Auct.*

1. ANTHOCEPHALUS CADAMBUS, *Roxb.*—For description, &c., see Pl. xxxv, under the name Nauclea, which should be altered to Anthocephalus. The dissection of the ovary was taken from poor dried specimens, and is not correct ; but I have no good flowers or fruit to enable me to give a better analysis of the genus.

ADINA. SALISB.

Gen. Char. Flowers compact in a globular head furnished with bracteoles, calyx-tube short, the segments 5 short or elongate persistent or deciduous sometimes alternate with 5 very short teeth or glands, corol-tube elongate glabrous within, lobes 5 short valvate rounded or ovate. Stamens 5 on short filaments inserted in the jaws just between the lobes, anthers exserted, disk cupular, ovary

2-celled, style filiform much exserted, stigma capitate or clavate, ovules numerous imbricate attached to the placenta which is pendulous from the apex of the cell, capsule septicidically 2-coccous, cocci dehiscing and often falling off and leaving a persistent axis, crowned by the star-like limb of the calyx, seed oblong, testa winged on each side, nucleus small, albumen copious, cotyledons plane, radicle terete superior. Trees or shrubs, leaves opposite petioled ovate lanceolate or cordate. Stipules large oblong obtuse caducous, flower-heads solitary or paniculate or slender generally articulated, peduncles bracteate or without bracts, receptacle pilose. Flowers small. *Salisb Parad. Lond.* i. 115. Nauclea sp., *Auct.*

1. ADINA CORDIFOLIA, *Roxb.*—For description, &c. see Plate xxxiii, under the name of Nauclea, which should be altered to Adina.

Analysis, Pl. XXIX, fig. 2.

1. A flower and some bracts removed from the globular head calyx hairy, segments 5, their apices swollen, corol-tube hairy outside, lobes flat valvate, style very long, stigma small capitate.
2. Corol opened to show the insertion of the stamens, the tube glabrous within.
3. Calyx, ovary and style.
4. One of the bracts.
5. Anther, front and back view.
6. The 2-celled ovary cut vertically, ovules numerous imbricate on a placenta pendulous from the apex of the cell, small teeth present betwen the calyx-segments. (From dried specimens).

STEPHEGYNE. KORTH.

Gen. Char. Flowers compact in a globose head furnished with bracteoles, calyx-tube short ovoid or obconical the limb cupular or tubular truncate or obscurely 5-toothed, corol infundibular the tube elongate, the jaws glabrous or pilose, lobes 5 short acute valvate. Stamens 5 inserted into the jaws or below the apex of the corol, filaments short filiform, anthers fixed by the back lanceolate cordate at the base apiculate, disk annular, ovary 2-celled, style elongate filiform much exserted, stigma capitate mitre-shaped or cylindric, ovules numerous imbricate inserted on a placenta pendulous from the apex of the cell or attached to the partition, fruit 2-coccous, cocci dehiscing many seeded. Seed small imbricate, testa winged on both sides, nucleus minute, albumen fleshy. Trees or shrubs, leaves ovate or lanceolate, stipules large caducous, heads of flowers axillary or terminal solitary paniculate or subumbellate often 2-bracteate; flowers yellow. *Korth. Verh. Nat. Gesch.* 160, *et t.* 35. Mitragyne, *Koth. Obs. de Naucl. Ind.* 19. *Ex. Miq. Fl. Ind. Bat.* ii. 140. Nauclea, *Auct.*

1. STEPHEGYNE PARVIFOLIA, *Roxb.*—For description, &c. see Plate xxxiv. under the name of Nauclea, which should be altered to Stephegyne.

Analysis, Pl. XXIX, fig. 1.

1. Portion of a branch in fruit.
2. A single capsule removed from the head, shewing the persistent calyx-tube and the bracteoles at the base
3 & 4. Vertical and transverse sections of the young fruit which contains 2 many-seeded cocci.

2. STEPHEGYNE TUBULOSA, *Arnt.*—A small tree, leaves submembranaceous, glabrous above, minutely puberulous on the costa and veins beneath, ovate obtuse or with a short blunt acumination rounded or slightly attenuated at the base, 2-6 inches long by 1½-3 inches broad, primary veins prominent beneath and furnished with hairy glands in the axils, veinlets minutely reticulated, petiole 4-6 lines long. Stipules large (10-11 lines long) membranaceous oval to obovate, peduncles terminal generally tern, sometimes solitary, when tern the middle one is very short, flower-heads 1-1½ inches in diameter furnished at the base with 2 foliaceous deciduous bracts which are like the leaves only smaller (1-2½ inch long). Calyx cylindric entire or subentire, bracteoles ciliate spathulate a little shorter than the calyx, corol purple, the lobes valvate very thick fleshy and triangular except at the base, anthers apiculate Stigma long mitre-shaped hairy at the apex only. Capsules 3-4 lines long oblong many-seeded. Nauclea tubulosa, *Arnt. Thw. En. Zey. p.* 137.

Ceylon, abundant in the south of the island.

Analysis, Pl. XXIX, fig. 1.

1. A flower bud and bracts removed from a head of flowers, bracts slightly ciliate, calyx-tubular truncate and quite entire, corol lobes valvate.
2. A full flower shewing the stamens slightly exserted.
3. A corol cut open to shew the insertion of the stamens; the tube within is slightly hairy in the upper part, the lobes are very thick and fleshy and solid except towards the base.
4. One of the lobes of the corol highly magnified.
5, 6. Anthers, front and back view; they are apiculate at the apex.
7. Style and mitre-shaped stigma.
8. The 2-celled ovary cut vertically, ovules pendulous numerous imbricate.
9. The pendulous mass of ovules removed from a cell of the ovary. (All drawn from dried specimens).

NAUCLEA. LINN.

Gen. Char. Flowers compact in a globose head ebracteolate or furnished with small bracteoles, calyx-tube turbinate or obconical, limb 5-lobed or 5-partite, the lobes often appendiculate, the appendage clavate at the apex valvate and deciduous before the flower opens, rarely spathulate or subulate and persistent. Corol tubuloso-infundibuliform, the tube elongate glabrous in the jaws, the lobes imbricate often with a horn at the back below the apex. Stamens 5 inserted in the jaws or on the tube below the apex, filaments filiform short or rather elongate or wanting anthers oblong exserted. Ovary 2-celled, style elongate filiform exserted. Stigma capitate

mitre-shaped clavate or fusiform, ovules numerous fixed on a placenta which is pendulous from the apex of the cell or adnate to the partition and ascending. Fruit 2-coccous, cocci splitting into 2, many-seeded. Seed linear or obovoid imbricate, testa winged, nucleus minute, albumen fleshy, embryo clavate. Trees generally very glabrous, leaves sessile or petiolate, stipules large deciduous, flower-heads rarely bracteate solitary or paniculate, flowers sessile yellow. *Linn. Gen. n.* 223.

1. NAUCLEA ELLIPTICA, *Dalz.*—A large tree, leaves elliptic acute at both ends coriaceous glabrous and shining above, with or without glands in the axils of the primary veins beneath, 5-8 inches long by 1½-3 inches broad, primary veins rather raised and prominent beneath, 6-14 on each side, petioles 6-12 lines long sometimes with a slightly dilated wing, stipules triangular about 3 lines long foliaceous deciduous, peduncles axillary and terminal solitary 1-2½ inches long, flower-head about 1 inch in diameter, bracteoles small clavate at the apex hairy. Calyx-segments subulate ciliate and hairy, corol yellowish-white the tube wider upwards glabrous inside and out, lobes 5 imbricate slightly puberulous on both sides oval to ovate furnished with a ridge along the centre of the back which terminates in a short horn a little below the apex, anthers apiculate slightly exserted, filaments nearly as long as the anthers. Style much exserted, stigma small globose, fruit not seen. *Dalz. Bombay Flora. p.* 118.

Very common in South Canara and Malabar up to 2000 feet elevation, generally on the banks of streams, called Ahnáo ; also on the Bombay ghats. My South Canara specimens have only 6-8 primary veins and always glands in the axils ; my Bombay specimens (sent by Dalzell) have 10-14 primary veins and no glands, but I can discover no other difference. The dissections are all taken from South Canara specimens.

Analysis, Pl. XXIX, fig. 3.

1. A flower bud and bracts removed from the head of flowers, calyx-segments subulato-lanceolate hairy and ciliate, corol-tube glabrous, lobes imbricate slightly puberulous.
2. A full flower, anthers very slightly exserted, style very long, stigma small globose capitate.
3. Corol opened out to show the insertion of the stamen tube, quite glabrous within.
4, 5. Anthers, front and back view, shewing the apiculation at the apex.
6. Outside view of one of the lobes of the corol, shewing that it has a ridge down its back terminating in a short horn below the apex.
7. Calyx, ovary and style.
8. Vertical section of the 2-celled ovary, ovules numerous imbricate on a placenta which is pendulous from the apex of the cell.

2. NAUCLEA PURPUREA, *Roxb.*—A tree glabrous, stipules oval obtuse caducous, leaves petioled oval-oblong acute or acuminated at both ends smooth and shining, 4-9 inches long, peduncles terminal solitary or in threes with often 2 deciduous small leaves at the apex, partial ones about as long as the diameter of the head of flowers usually shorter than the general one, tube of the calyx glabrous, limb hirsute, segments clavate, corol purple glabrous, lobes spreading, anthers scarcely exserted, style long, stigma somewhat capitate globose, capsule valves 4 splitting from the base upwards. *Roxb. Fl. Ind. ed. Wall.* ii. 124 ;—*WA. Prod. p.* 391.

Mountainous parts of the east side of the Presidency. I have no specimens.

3. NAUCLEA PEDUNCULARIS, *Wall.*—A middling sized tree glabrous, the branches a little compressed, leaves ovato-elliptic coriaceous acuminate glabrous, peduncles terminal short stout, pedicels 3 slender 15-18 lines long, flower heads 8-9 lines in diameter, no bracteoles, calyx segments linear spatheolate rounded at the apex a little hairy, corol yellowish turning to purple, tube a little hairy towards the apex outside, and hairy within, lobes oblong hairy outside and furnished with a short horn below the apex, filaments about as long as the anthers, anthers apiculate, stigma globose sulcate, ovules about 7, placenta pendulous from nearly the apex of the partition. *Wall. cat.* 6091 ;—*Walp. Rep.* ii. 512 ;—*Thw. En. Pl. Zey. p.* 137.

Ceylon, Saffragram and contiguous districts up to 1000 feet not uncommon ; Central provinces rare.

UNCARIA. SCHREB.

Gen. Char. Flowers sessile or pedicelled laxly aggregated in a globose head, calyx-tube elongate fusiform, the limb campanulate infundibular or shortly tubular 5-lobed or 5-parted, corol tubuloso-infundibular, tube elongate glabrous in the jaws, lobes 5 valvate. Stamens 5 inserted into the jaws of the corol, filaments short, anthers oblong, 2-setose at the base, affixed at the back. Disk inconspicuous. Ovary fusiform 2-celled, style slender much exserted, stigma capitate, ovules numerous ascending inserted on a prominent placenta which is fixed to the partition, capsule elongate 2-celled septicidally 2-valved, many-seeded, seeds imbricate, nucleus small, testa with a long wing on both sides, the wing often 2-partite above, albumen fleshy, embryo clavate, cotyledons short, radicle obtuse. Scandent shrubs glabrous or tomentose, leaves opposite shortly petiolate, stipules interpetiolar entire or 2-fid, flower-heads axillary pedunculate generally solitary sometimes paniculate, the sterile peduncles often changing into hooked tendrils, flowers often tomentose or villose, yellow. *Schreb. Gen.* i. 125 ;—*Benth. & Hook. Gen. Pl. p.* 31. Ourouparia, *Aubl. Pl. Gen.* i. 177. *t.* 68. Agylophora, *Neck. Elem.* i. 145.

1. UNCARIA GAMBIER, *Hunter.*—A stout scandent shrub, leaves opposite, short petioled ovate-oblong to ovate-lanceolate entire acute smooth on both sides, about 4 inches long by 2 broad, stipules oblong caducous, tendrils axillary solitary or in opposite pairs, simple recurved hooked, peduncles axillary solitary, bracteated and jointed about the middle, supporting a single globular head of beautiful green and pink florets, bracts about the middle of the peduncle annular cup-like 3-4-cleft, calyx sericeous on the outside limb 5-cleft, corol-tube filiform, lobes 5 obtuse villous on the outside and hairy in the centre inside, filaments short, anthers large on the mouth of the tube, ovary turbinate subsessile sericeous. Style as long as the tube of the corol, stigma clavate, capsules pedicelled clavate longitudinally grooved crowned with the 5-cleft permanent calyx 2-celled 2-valved, seed numerous imbricate winged. *Roxb. Fl. Ind. ed. Wall.* ii. *p.* 126.

Ceylon, about Colombo and the Central provinces up to 3000 feet elevation, also in Malacca, Sumatra and Pulo-Penang. Gambier is the Malay name of an extract prepared from the leaves, and which is chewed by the natives with betel leaf and areca nut.

Tribe II, CINCHONEÆ.—*Corol-lobes valvate imbricate or contorted, ovary 2-celled, ovules very numerous in the cells, fruit capsular, seed numerous minute vertical or ascending, peltate imbricate, winged, albuminous, radicle generally superior. Trees or shrubs, stipules entire.*

Sub-Tribe I, EUCINCHONEÆ.—*Corol valvate.*

HYMENODICTYON. WALL.

For Gen. Char. see letter-press to Pl. ccxix.

1. HYMENODICTYON OBOVATUM, *Wall.*—For description, &c. see Pl. ccxix.

2. HYMENODICTYON EXCELSUM, *Roxb.*—A large tree, leaves opposite petioled oblong entire soft downy particularly beneath, 6-12 inches long 3-5 inches broad, stipules cordate serrate; floral leaves, the lower pair or two of the ramifications of the panicle are ornamented each with a pair of floral leaves much smaller but similar in shape to the ordinary leaves colored more permanent and bullate, petioles round downy 2-3 inches long, panicles terminal large generally with the lower branchlets cross-armed, flowers fascicled small greenish-white very fragrant, calyx 5-toothed, corol-tube long downy, limb 5-parted, lobes oval spreading, filaments 5 short free inserted into the mouth of the tube, style twice as long as the tube, stigma capitate globose, capsule oblong crowned with the remains of the calyx about as thick as a field bean, but twice as long, 4-striated marked with small white elevated specks. *Roxb. Fl. Ind.* i. 529.

Common on the eastern mountains of this Presidency and the Godavery forests, Kurnool hills, &c., called Dudippi in the Godavery jungles, Chetippa (Circars), and Mànà bira in the Kurnool district; the wood is firm, close-grained, of a pale mahogany color, and is used for gun stocks and a variety of purposes.

3. HYMENODICTYON UTILE, *Wight.*—A large tree, leaves roundish ovate abruptly acuminate, glabrous above villous beneath, stipules broad ovate obtuse glanduliferous on the margins, panicles terminal loose, branches racemose, flowers pedicelled bracteolate fascicled, corol funnel-shaped, tube about twice the length of the calyx-limb, filaments free inserted on the throat, anthers oblong apiculate subsaggitate at the base. *Wight Icones letter-press to tab.* 1159. H. obovatum, *Wight Icones tab.* 80 (not *Wall.*) H. excelsum, *WA. Prod. p.* 392 (not *Roxb.*)

A common tree in our western jungles, called Bastard-cedar at Palghaut, and much in use there in cabinet making, called Perunjoli in Tamil. I am not sure whether it is distinct from Hymenodictyon thyrsiflorum, *Roxb*, a Bengal species which I have not seen. For analysis of the flower, see figure *A* Plate ccxix.

Tribe III, RONDELETIÆ.—*Corol-lobes imbricate or contorted, ovary 2-celled, fruit capsular, seeds numerous in the cells horizontal minute not winged or rarely winged albuminous, embryo clavate or cylindric. Trees or shrubs, stipules simple rarely 2-cleft.*

WENDLANDIA. BARTL.

For Gen. Char. see letter-press to Pl. ccxxiv.

1. WENDLANDIA NOTONIANA, *Wall.*—For description, &c. see Pl. ccxxiv.

2. WENDLANDIA EXSERTA, *Roxb.*—A small tree, young branches villous, leaves broad lanceolate softly downy on both sides, 4-6 inches long, petioles short flat on the upper side, downy; stipules semilunar reflexed downy, panicles terminal large diffuse ovate, branchlets round and downy, bracts subensiform variable in size, flowers numerous pure white fragrant. Calyx hoary 5-toothed. Corol-tube short contracted at the mouth by 5 elevations on the inside, lobes 5 oblong recurved, filaments nearly as long the corol-lobes; capsule villous. Rondeletia exserta, *Roxb Fl. Ind.* i. *p.* 523. Wendlandia exserta, *WA. Prod. p.* 402.

Very common in the Orissa country and in the north-east part of this presidency, but I have never seen it in the south.

3. WENDLANDIA TINCTORIA, *Roxb.*—A small tree, young shoots 4-sided ferrugineo-tomentose, leaves opposite or verticelled in threes, oblong to lanceolate, above glabrous, beneath with a few hairs on the costa and veins, 4-6 inches long 1-2½ inches broad, petioles short somewhat winged. Stipules triangular, subulate hairy on both sides, panicles terminal large, branchlets numerous 4-sided hairy, bracts hairy those of the ultimate divisions ensiform with a hastate base and embracing 3 flowers, bracteoles small 1 to each flower, flowers very numerous small white subsessile, calyx hairy 5-toothed, corol tube slender many times longer than the calyx, lobes ovate spreading, filaments very short inserted immediately under the fissures of the lobes; style as long as the tube, stigma 2-lobed, lobes oblong; capsule spherical minute. Rondeletia tinctoria, *Roxb. Fl. Ind. ed. Wall.* i. 134.

Common with the preceding, also in the Godavery forests, &c., but not occurring in the south of the presidency. Its bark is used by the natives as a mordant in some of their dyes.

Tribe IV, MUSSÆNDEÆ.—*Corol lobes valvate, ovary 2-many-celled, cells many ovuled, fruit indehiscent fleshy baccate or with two many pyrenes, 2-many celled, cells many-seeded. Seed minute globose or angled very rarely compressed, testa often foveolate or reticulate, albumen fleshy; embryo minute ovoid or clavate, cotyledons very rarely broad or plane.*

MUSSÆNDA. LINN.

Gen. Char. Calyx-tube oblong or turbinate, the lobes of the limb 5 short or elongate erect patent or recurved deciduous rarely persistent, one of them often produced into a large petioled reticulately veined white or colored leaf. Corol infundibuliform the tube elongate often silky, the jaws villous, lobes 5 small often acute reduplicately valvate, the apices often twisted. Stamens 5 in-

serted in the jaws of the corol, filaments very short, anthers fixed by the back included narrow linear acute or obtuse, disk annular or terminal. Ovary 2-celled, style filiform the branches 2 linear subacute papillose within, ovules very numerous in the cells, inserted in many series on to the fleshy placentas which are peltately attached to the partition, fruit fleshy and indehiscent, rarely capsular and dry, oblong, areolate or crowned with the persistent calyx at the apex, 2-celled many-seeded. Seed minute oblong turgid or compressed, testa coarsely foveolate, albumen fleshy. Embryo minute subcylindrical or clavate 2-fid. Shrubs, erect or climbing leaves opposite or ternately verticellate membranaceous subsessile or petiolate. Stipules interpetiolar solitary or twin free or connate generally deciduous, flowers orange or rarely white in terminal many flowered corymbs. *Linn. Gen.* 241;—*Benth. & Hook. Gen. Pl. p.* 64. Spallanzania, *DC.*

1. MUSSÆNDA FRONDOSA, *Linn.*—A large shrub, leaves oval acuminate villous or hirsute to nearly glabrous, branches and corymbs when young pubescent or more or less tomentose, calycine segments subulate 2-4 times the length of the ovary hirsute, one of them in some of the axillary flowers of the corymbs produced into a large acute pubescent or villous white leaf, corol externally hirsute. Style the length of the tube, fruit at first hairy afterwards nearly or quite glabrous obovoid. *Linn. Sp. p.* 251;—*WA. Prod. p.* 393. M. glabra, *Vahl.*

Common throughout this presidency and in Ceylon, Bengal, &c., the leaves are sometimes boiled and eaten as a vegetable; called in Ceylon Maassenda.

Analysis, Pl. XVI, fig. 3.

1. A full flower.
2. The same corol removed.
3. Corol opened out, the filaments adnate to the tube.
4. A calyx and style.
5. A calyx in which one of the segments is enlarged, foliaceous white and leaf-like.
6. Anthers, front and back view, filaments cut short.
7. Ovary cut transversely 2-celled, 2 bifid placentas from the centre of the axis, ovules numerous.
8. Vertical section of an ovary.

M. corymbosa, Roxb. Fl. Ind. i. 556, *is not, I think, distinct, and I believe that there is only one (variable) species in South India and Ceylon.*

UROPHYLLUM. WALL.

Gen. Char. Flowers hermathrodite or by abortion unisexual, calyx-tube turbinate globose or obconical, limb cyathiform 5 rarely 4-7-toothed persistent, corol coriaceous rotate shortly tubular or infundibuliform, tube short villous in the jaws, lobes 5 rarely 4-7 erect or patent triangular valvate. Stamens 5 (rarely 4-7) inserted in the jaws of the corol, filaments short, anthers fixed by the back linear acute included shortly bifid at the base, disk tumid annular sulcate, ovary 4-7 generally 5-celled, style short glabrous or puberulous, stigma ovoid or clavate entire or 4-7 cleft the lobes at length patent, ovules numerous in the cells crowded on the placentas which are fixed to the centre of the axis, fruit small 4-5-celled many-seeded. Seed minute subglobose, testa crustaceous foveolato-reticulate, albumen fleshy, embryo clavate 2-fid. Shrubs glabrous or strigosely pubescent, leaves opposite petioled generally oblongo-lanceolate, stipules broad or elongate, flowers small in axillary cymes or corymbs. *Wall. in Roxb. Fl. Ind. ed. Wall.* ii. 184. Axanthes, *Bl. Bijd.* 1002. Wallichia, *Reinw. ex. Blume. in Flora* 1825, 107. not *DC.*

1. UROPHYLLUM ZEYLANICUM, *Wight.*—Arboreous, ramuli terete or obscurely 4-sided glabrous, stipules minute triangular, leaves lanceolate acuminate glabrous on both sides finely reticulated with slender brownish veinlets, inflorescence cymose, cymes simple axillary usually paired, peduncles about the length of the petioles, calyx entire or slightly 5-toothed, corol rotate 5-cleft dull orange-yellow. Style almost obsolete, berry globose size of a pea. Axanthes zeylanica, *Wight Icones tab.* 1163.

Ceylon, central provinces, at an elevation of 4000-7000 feet.

Analysis, Pl. XVI, fig. 5.

1. Portion of a branch showing leaves and flowers.
2. A flower bud, petals valvate.
3. A flower, corol removed, shewing the 5-lobed ovary and deeply 5-cleft style.
4. A full flower.
5. Corol removed and opened out.
6. Anthers, front and back view,
7. Ovary cut vertically, shewing the placentas and ovules.
8. Ovary cut transversely, 5 cells.
9. Branch in fruit.
10. A fruit.
11. A seed.

2. UROPHYLLUM ELLIPTICUM, *Wight.*—Arboreous, ramuli terete glabrous or very sparingly pubescent, leaves elliptic shortly and abruptly acuminated, glabrous above paler and villous beneath especially on the somewhat prominently reticulated veins, penniveined, stipules linear-lanceolate longer than the petioles deciduous, corymbs short subcapitate solitary or paired. Corol rotate 5-lobed dull orange-yellow, anthers apiculate. Style exceeding the disk, stigmas 5 connivent. Axanthes elliptica, *Wight Icones tab.* 1164.

Ceylon, central provinces, 4000-7000 feet elevation.

Tribe V, GARDENIEÆ.—*Corol-lobes contorted or imbricate, ovary 1-many celled, cells many-or few-ovuled, fruit indehiscent fleshy baccate 1-many-celled, cells 1-many seeded, endocarp sometimes bony or crustaceous. Seed large or more rarely small, compressed or obtusely angled, testa membranaceous coriaceous or fibroso-cartilaginous rarely bony, albumen horny or fleshy. Embryo large, cotyledons generally ample foliaceous.*

RANDIA. LINN.

Gen. Char. Calyx-tube ovoid obovoid or turbinate terete or costate, the limb often tubulose truncate rarely dentate or lobate, the lobes elongate or foliaceous persistent or deciduous. Corol infundibular campanulate or hypocrateriform short or long, the jaws glabrous or ciliate, lobes 5 rarely more, contorted, stamens 5 inserted into the jaws or mouth of the corol, filaments short or 0, anthers fixed by the back narrow linear included in the tube or exserted, disk annular, ovary 2-(rarely 3-4) celled, style glabrous or pilose, stigma clavate or fusiform entire or 2-toothed, ovules numerous in each cell rarely 2 or few attached to a fleshy peltate placenta. Fruit a berry succulent indehiscent often crowned by the calyx-limb 2-celled many-seeded. Seed generally immersed in a fleshy or pulpy placenta, testa generally adhering to the horny albumen, embryo axile, cotyledons orbicular foliaceous, radicle terete. Small trees or shrubs or creepers, unarmed or armed with axillary or supra-axillary thorns, leaves generally coriaceous obovate oblong or lanceolate. Stipules interpetiolar solitary on each side pointed, with a broad base but not united, often deciduous, flowers large or small in axillary cymes or clusters or solitary at the summit of short branches, white or yellow, rarely rose. *Linn. Gen. n.* 211. Oxyceros, *Lour. Fl. Cochin.* 150. Stylocoryne, *Cav. Ic.* iv. 45. *t.* 368. (not *WA.*) Cupia, *DC. Prod.* iv. 394. Griffithia, *WA. Prod.* 399. Coriscus, *Gærtn. Fruct.* iii. 140. *t.* 28. Pseudixora, *Miq. Fl. Ind. Bat.* ii. 209. Gynopachys, *Blume. Bijdr.* 983.

1. RANDIA DUMETORUM, *Lam.*—A thorny ramous shrub, or in good soil a small tree, spines opposite, leaves oval somewhat obtuse cuneate at the base glabrous or when young slightly pubescent, flowers solitary terminal on the young shoots, shortly pedicelled, limb of the calyx campanulate, lobes oblong, corol hirsute on the outside fragrant, tube rather longer than the segments of the calyx furnished on the inside near the base with a ring of erect dense hairs, fruit usually globose, rarely oblong crowned with the limb of the calyx. *Lam. Ill. t.* 156. *fig.* 4 ;—*W A. Prod p.* 397. Gardenia dumetorum, *Retz. Obs.* 2, *p.* 14. Posoqueria dumetorum, *Roxb. Fl. Ind.* i. 713. Gardenia spinosa, *Linn. Suppl. p.* 164. Ceriscus Malabaricus, *Gærtn.* i. *t.* 28. Randia longispina, *WA. Prod.* 398. Posoq. longispina, *Roxb. Fl. Ind.* i. 716.

Very common in the plains of Southern India and Ceylon, called Manga in Teligu ; it is often employed for fences and fire-wood. The fruit, which resembles a small yellow apple, is bruised and thrown into ponds to intoxicate fish, they are then easily captured, and it is not deemed that the effects of the fruit render them unwholesome.

Analysis, Pl. XVI., fig. 1.

7. Fruit cut vertically, shewing the numerous seeds nestling in the pulp.
8. Fruit cut transversely, 2-celled with a central placenta.
9. A seed.
10. A seed cut vertically to show the embryo.
11. An embryo.

2. RANDIA ULIGINOSA, *Roxb.*—A rigid ramous small thorny tree, branches straight 4-angled, branchlets decussate horizontal terete bearing 1-4 thorns and 1-3 short pedicellate flowers at their extremities, leaves opposite or the young shoots fascicled at the extremities of the branchlets, short petioled oblong smooth shining, 2-3 inches long by 1½ inch broad, flowers large white and fragrant, limb of the calyx tubular bluntly 5-toothed or nearly quite entire a little shorter than the tube of the corol, corol villous in the mouth, border flat 5-8 lobed nearly 2 inches in diameter, lobes orbicular, fruit 2-celled size and shape of a pullet's egg, rind greyish. Seeds numerous oval flattened. Posoqueria uliginosa, *Roxb. Fl. Ind.* i. 712. Randia, *WA. Prod p.* 398.

Very common in many parts of the plains in this presidency and in Ceylon, generally in swampy places, or banks of rivers, also on the mountains up to 3000 feet. In Ceylon the unripe fruit is used as a vegetable. In Teligu it is called Nalla Kákisha ; the wood is hard and close grained and suitable for turnery purposes.

Analysis, Pl. XVI, fig. 1.

1. A flower bud, corol lobes 6, much contorted.
2. A full flower, corol lobes 5 (they vary from 5 to 8), stamens sessile inserted between the lobes.
3. Front, back and side views of the anthers.
4. A flower, corol removed.
5. The ovary cut vertically, ovules numerous attached to a central placenta.
6. Ovary cut transversely, cells 2.

3. RANDIA FRAGRANS, *Kœn.*—A rigid glabrous armed shrub, thorns opposite or sometimes absent (when in rich soil), leaves 2-3 inches long by 1½ inches broad short petioled obovate to oblong cuneate at the base coriaceous, with concave glands that are hairy on the margin in the axils of the veins, stipules interpetiolar solitary on each side, distinct roundish-ovate with a cuspidate point caducous, flowers white pedicelled on a nearly simple very short peduncled umbel-like corymb at the ends of the branches, or on short lateral knobs or leafless young shoots, pedicels bibracteolate near the base, calyx-tube obovate short, limb 5-toothed, segments acute deciduous, corol infundibuliform hairy in the throat, lobes 5 spreading narrow-oblong acute. Stamens 5, anthers long linear acuminated exserted attached by their back a little above their base to the mouth of the tube of the corol, the filaments scarcely any. Style filiform the length of the tube of the corol, stigma entire long fusiform striated exserted, berry globose the size of a large pea or a little larger, red when ripe, marked on the apex with a circular scar, 8-10 seeds in each cell, seeds angled nestling in pulp. Posoqueria fragrans, *Kœn. MS. in Roxb. Fl. Ind.* i. 717. Griffithia, *WA. Prod. p.* 400. Randia Malabarica, *Lam.* Stylocoryne Pandaki, *DC.* iv. 377.

A very common shrub in many parts of this presidency, in use as a hedge plant, also in Ceylon up to 3000 feet elevation.

4. RANDIA GARDNERI, *Thw.*—A small elegant tree up to 20 feet high unarmed, ramuli terete a little compressed, leaves glabrous shining lanceolate acuminate narrowed at the base, 2-4½ inches long by ¾-1½ inch broad, petiole 2-3 lines long, corymbs

axillary shorter than the leaves shortly pedunculate sparingly pilose at length glabrous, pedicels rather elongate, bracteoles small, flowers yellow, calyx minutely 5-toothed externally pilose, corol externally subglabrous, internally pilose at the jaws, tube 2 lines long, lobes linear-lanceolate 4 lines long, placentas with 8-12 ovules, berry subspherical 4-5 lines in diameter. Griffithia Gardneri, *Thw. En. Pl. Zey. p.* 158;—*Bedd. Icones Pl. tab.* xxxviii.

South Tinnevelly mountains, Ceylon 2000-4000 feet elevation.

5. Randia rugulosa, *Thw.*—A shrub, the young branches pilose, leaves rugulose ovate or ovato-lanceolate shortly acuminate, pilose beneath on the veins at length glabrous, 2-5 inches long by 1-3 inches broad, petioles 2-3 lines long, stipules rotundate cuspidate glandulose within at the base, corymbs adpressedly pilose leaf-opposed in the axis of a small abortive spine-like leaf, calycine teeth short subulate, berry globose as large as a pea. Griffithia rugulosa, *Thw. En. Pl. Zey. p.* 159.

Ceylon, Ambagamwa, Saffragam and Galle districts.

6. Randia speciosa, *Bedd.*—Scandent, unarmed, branches terete, slightly hairy at the joints under the stipules; leaves glabrous shining broad ovato-lanceolate up to 10 inches long by 4 broad, acuminate, attenuated at the base, petioles nearly 1 inch long; stipules triangular glabrous caducus, corymbs leaf opposed (alternate with pairs of leaves) much shorter than the leaves, peduncles up to ½ an inch long, podicels elongate bracteolate at the base, calyx truncated and with the peduncles and pedicels slightly pilose (splitting like a spathe) furnished with 5 small teeth at the apex, corol glabrous outside, hairy in the jaws, cream colored, up to 1½ inch in diameter, anthers subsessile, stigma clavate muriculate; berry subglobose, 6-8 lines in diameter. *Bedd. Icones Pl. Ind. tab.* xxxvii.

A very handsome creeping shrub common on the west slopes of the Nilgiris, Coorg, Canara, Travancore, &c., the flowers are very fragrant.

7. Randia Deccanensis, *Bedd*—An unarmed tree, 30 feet high, young shoots tomentose, leaves broadly-ovate rhomboid-ovate or almost orbicular obtuse or emarginate scarcely coriaceous, above glabrous or subglabrous in age beneath densely velvetty, 3-4 inches long by 2-4 broad, petioles ½-1 inch long, cymes axillary or from the old axils a little shorter than the leaves subglabrous rather loose, the branchlets 3-flowered, flowers 5-merous white 6 lines in expansion, calyx cup-shaped the teeth small acute, corol hairy outside, tube scarcely as long as the lobes hairy in the jaws, lobes rounded. Stamens exserted quite sessile, style linear, stigma scarcely exserted globular entire; ovary cells 5-ovuled, fruit not seen. *Bedd. Icones Pl. Ind. Or. tab.* ccxxxvii.

Nallaymallay mountains, Kurnool.

WEBERA. Schreb.

Gen. Char. Calyx-tube obovoid or turbinate, limb small shortly tubulose and 5-cleft or 5-parted deciduous or rarely persistent, corol infundibular or salver-shaped, the tube short or elongate glabrous or villous in the jaws, the lobes 5 longer or shorter than the tube, narrow patent or reflexed much contorted. Stamens 5 inserted into the mouth of the corol, filaments short or 0. Anthers fixed by their back narrow linear often acute; ovary 2-celled, style glabrous or pilose elongate, stigma fusiform sulcate thick or slender often much exserted, ovules numerous in the cells rarely 2 or solitary, placentas fleshy peltately affixed to the partition, berry pisiform coriaceous or fleshy 2-celled, cells 1-few-many-seeded, seed angled suborbicular, testa membranaceous coriaceous or crustaceous, albumen fleshy or cartilaginous, embryo small, cotyledons small flat foliaceous, radicle terete excursive or inferior or next the hilum. Trees or shrubs glabrous or pubescent, leaves oblongo-lanceolate, flowers in terminal many flowered corymbs. *Schreb. Gen.* 794. Stylocoryne, *WA. Prod.* 400 not *Cav.* Tarenna, *Gærtn. Fr.* i. 139. *t.* 28. Ceriscus, *Nees.* Wahlenbergia, *Bl.* Chomelia, *Linn. Gen. ed.* i. 55.

This genus differs from Randia chiefly in its terminal inflorescence.

1. Webera Asiatica, *Linn.*—A glabrous unarmed shrub, young shoots gummy, leaves lanceolate-oblong shining, 6-7 inches long by 2½ inches broad, corymbs trichotomous terminal, calyx-limb 5-cleft, corol-tube short slightly widened and bearded at the mouth white and rather fragrant, lobes oblong recurved villous at the base along the middle, style slightly hairy, stigma 10-sulcate the sulcations wing-like, ovary cells 2-many ovuled, berry the size of a large pea smooth shining black. Seeds 2-8 in each cell. Rondeletia Asiatica, *Linn. Sp. p.* 244. Stylocoryne Webera, *A. Rich. in Mem. Soc. Hist. Nat. Par.* 5 *p.* 248. Webera corymbosa, *Willd. Sp.* i. 1224;—*Roxb. Fl. Ind. ed. Carey. vol.* 2. 533.

A rather large shrub common throughout the presidency and in Ceylon. Stylocoryne rigida, *Wight Icones tab.* 1064, is, I believe, only a mountain form of it, at least I can find nothing of really specific distinction in my numerous specimens.

Analysis, Pl. XVI, fig. 2.

1. A flower bud, the corol lobes contorted.
2. A full flower.
3. Corol opened to show the insertion of the stamens.
4. The flower, corol removed to show the style and stigma, the latter is generally 10-sulcate, the sulcations wing like; this is not correctly shewn in the plate.
5. Anther, back view.
6. Anther, front view.
7. Ovary cut vertically, 2 collateral ovules in each cell.
8. Ovary cut transversely, shewing 2 cells each with 2 ovules (the ovules are sometimes numerous in each cell.)
9. A fruit.
10. The same cut vertically.
11. The same cut transversely, 2 cells, each cell with 2 seeds (sometimes 4-8 seeds are present.)
12. A seed.
13. A seed cut vertically, shewing the embryo.

14, 15, 16, 17. These are views of flowers with much swollen ovaries, several of which are generally to be found in each corymb; and on cutting the ovary it is found to be hollow and has the appearance of having been attacked by insects whilst young; the style of these flowers is shorter than in the others.

2. Webrea monosperma, *WA.*—Shrubby glabrous, leaves lanceolate-oblong shining, about 5 6 inches long by 1¾ inch broad. Corymbs trichotomous with rather few flowers terminal, calyx limb cupulate minutely 5-toothed, tube of corol infundibuliform many times longer than the calyx (about 10 lines in length) pubescent on the inside, lobes oblong glabrous about ½ as long as the tube, ovary with 2-3 ovules in each cell, style slightly hairy, stigma acute compressed with a furrow along each side, berry white and about as large as a small cherry fleshy 1-celled 1-seeded. Seed not angled. Stylocoryne monosperma, *WA. Prod. p.* 401 ;—*Wight Icones tab.* 317.

I do not know this plant, and the figure in White's *Icones* has more the appearance of a Pavetta, and is very like one that I have from the northern slopes of the Nilgiris and Peria peak in Wynaad, but it cannot belong to that genus if it is correctly described as having 2-3 ovules on each cell.

SCYPHOSTACHYS. Thw.

Gen. Char. Calyx-tube short hemispherical, the limb produced beyond the ovary and unequally 4-cleft, the segments persistent, corol shortly tubulose, villous in the jaws, lobes 4 short recurved contorted. Stamens 4 sessile or subsessile, anthers fixed by the back above the base included oblong, disk tumid, ovary 2-celled. Style short its branches 2 short pilose ; ovules about 4 in each cell, the placenta adnate to the centre of the axis, berry ovoid or narrow oblong areolate at the apex 2-celled few-seeded. Seed large pendulous ovoid, testa coriaceous sulcate, albumen fleshy, embryo small, excentric, cotyledons small, radicle terete. Shrubs, erect ; leaves lanceolate or oblong, coriaceous. Stipules interpetiolar connate at the base acuminate, pendulous axillary or supra axillary few flowered, bracteoles large connate sheathing, flowers small sessile. *Thw. En. Pl. Zey. p.* 157.

1. Scyphostachys coffeoides, *Thw.*—A shrub, leaves lanceolate much attenuated at both ends acuminate at the apex, glabrous subcoriaceous, 2½-5 inches long by ¾-1¾ inch broad, petiole 1-2 lines long, stipules entire at the margins glabrous inside subscariose, peduncle very short or wanting, flower solitary at first almost quite enclosed in the large sheathing subscariose bracteole, fruit a red berry, seed oblong striated about 2 lines long. *Thw. l. c.*

Ceylon, Ratnapoora district, abundant but up to no elevation ; called Wal-copee.

Analysis, Pl. XVI, fig. 6.

1. Portion of a branch in flower.
2. A flower.
3. A flower, corol removed, shewing the tumid disk.
4. Corol removed and opened out.
5, 6. Anthers, front and back view.
7. Ovary cut vertically.
8. Ovary cut transversely.
9. A fruit.
10 A fruit cut vertically.
11, 12. The placentas with the ovules attached removed from the ovary.
13. A seed.
14. A seed cut vertically, the embryo small excentric lying in fleshy albumen, radicle terete. (From a drawing by Dr. Thwaites.)

2. Scyphostachys pedunculatus, *Thw.*—A shrub, branches rather scabrous, leaves glabrous except the costa beneath which is hairy oblong with a longish acumination at the apex, 3-6 inches long by ¾-2¼ inches broad. Stipules triangulari-ovate from a very broad base cuspidate striated fimbriate at the margin and pilose on the inside, petiole 2 lines long, peduncle axillary solitary 4-6 lines long deflexed (except when very young) few flowered, bracteoles about 5-8 striate cuspidate pilose within and at the margins much imbricate and forming a short dense spike about 6 lines long at the apex of the peduncle. Corol externally pilose, berry ovoid 7 lines long black-purple generally 1-seeded. Seed linear-oblong about 4 lines long. *Thw. l. c.*

Ceylon, Pasdoon Corle, at no elevation.

GARDENIA. Linn.

Gen Char. Calyx-tube ovoid or obconical, the limb various tubulose spathaceous lobate or partite generally persistent. Corol salver-shaped, campanulate or funnel-shaped much exceeding the calyx-tube generally glabrous in the jaws, lobes 5-9 or rarely 11 patent or recurved short or elongate contorted. Stamens equal in number to the corol-lobes and inserted between them in the jaws, filaments none or very short, anthers fixed by the back linear-oblong acute or obtuse included or shortly exserted, disk various generally annular or conical. Ovary 1-celled incompletely divided by 2-3-5 projecting parietal placentas with several ovules to each placenta. Style thick the apex clavate or fusiform terete or sulcate the apex entire or 2-3-fid, lobes stigmatose within, fruit sessile oblong ovoid cylindrical or pyriform terete or costate coriaceous or fleshy or irregularly ruptured or with a hardened 2 5 valved endocarp. Seeds numerous immersed in the fleshy or pulpy placentas, compressed or turgid, testa coriaceous or membranaceous, albumen generally horny, embryo of middling size, cotyledons broad foliaceous, radicle terete close to the hilum. Trees or shrubs, the young shoots often exuding a resinous gum, stipules solitary on each side entire more or less connate round the stem within the petioles and often very deciduous. Flowers usually rather large solitary or 3 together terminal, or axillary by the non-development of the flowering branch. *Linn. Gen. n.* 296.

1. Gardenia lucida, *Roxb.*—A small tree or large shrub, unarmed, buds resinous, leaves very short petioled oblong oval or obovate obtuse or with a short blunt point glabrous hard shining, about 6 inches long by 3 inches broad, with simple parallel veins and connecting veinlets, flowers somewhat terminal solitary, pedicels ½ to 1 inch long. Calyx-segments 5 long subulate more or less hairy particularly inside Corol hypocrateriform, tube long (about 1½ inch) glabrous or slightly hairy striated, lobes 5 obovate-oblong generally a little shorter than the tube glabrous. Anthers sessile, stigma entire, ovary with 2 parietal placentas, ovules numer-

ous, berry drupaceous even oblong, as large as a pigeon's egg crowned with the whole limb of the calyx, nut very hard thick and bony with 2 parietal receptacles. *Roxb. Fl. Ind.* i. 707.

Found throughout the presidency, particularly abundant on the mountains on the east side and the centre of the peninsula; called Tella manga in the Circars, and Karinga in the Godavery forests; the wood is close grained and valuable for the lathe.

Analysis, Pl. XV, fig. 6.

1. A flower bud shewing the long subulate calycine segments and the contorted æstivation of the corol.
2. A full flower smaller than usual, tube hairy (it is sometimes glabrous), lobes glabrous.
3. Portion of the tube of the corol opened to show the insertion of the stamens.
4. Stamens, front and back view (quite sessile.)
5. Calyx opened to show ovary, style and stigma.
6. Ovary cut transversely, shewing the 2 parietal placentas and numerous ovules.
7. A very young fruit (All drawn from fresh specimens.)

2. GARDENIA GUMMIFERA, *L.*—A small tree or large shrub unarmed, buds resinous, leaves sessile narrow elliptic oblong to ovato oblong obtuse or very shortly and bluntly pointed, puberulous and slightly scabrous when young afterwards shining, veins simple parellel, flowers terminal, 1-3 together almost sessile, calyx densely puberulous and slightly scabrous, segments short ovate acuminate. Corol hypocrateriform, tube long slender widened at the mouth sparingly pubescent; lobes 5 narrow oblong more than half the length of the tube almost glabrous, stigma clavate entire striated, berry drupaceous even oblong crowned with the whole limb of the calyx. Nut with 4-5 parietal receptacles. *Linn. F. Supp. p.* 164. G. arborea, *Roxb. Fl. Ind.* i. 708.

Found in similar localities to the last, from which it chiefly differs in its calyx.

3. GARDENIA LATIFOLIA, *Ait.*—A small tree or large shrub unarmed, leaves opposite or verticelled in threes very shortly petioled, oval to obovate glabrous with a small hairy gland in the axils of the veins on the under side; 6-8 inches long by about 3 inches broad, flowers terminal solitary, pedicels scarcely 1 line long; calyx campanulate, segments or teeth very irregular hirsute on the inside. Corol hypocrateriform, tube long (about 2 inches) hirsute on the outside, lobes about 9 obliquely obovate about ½ as long as the tube hirsute towards the outer margin on the outside. Stigma clavate thick and fleshy bipartite, segments bifid, berry even nearly globose 15-16 lines each way crowned with the whole limb of the calyx. Nut thin brittle and bony with 4 parietal placentas. *Ait. Hort. Kew* i. *p.* 294;—*WA. Prod. p.* 395;—*Wight Icones tab.* 759.

Kurnool district, Coimbatore district, and southern districts of the presidency, ascending the mountains to 3500 feet, called Pedda Karingà in Teligu, also in Ceylon near Colombo.—Gardenia enneandra, *Koen.* (G. latifolia, *Roxb. Fl. Ind.* i. 706, differs in its description by the flowers being sometimes 3-4 together and the corol lobes being sometimes 11, but I suspect it is the same as this species; if not, I have never met with it.)

4. GARDENIA TURGIDA, *Roxb.*—A small armed tree or large shrub with swollen mealy bark. Spines opposite above the axils and terminal, leaves glabrous subsessile obovate entire 1-4 inches long by 1-3 broad. Stipules acute, flowers axillary or lateral solitary or twin subsessile large white fragrant, calyx short cylindric smooth with 5 small teeth; corol-tube many times longer than the calyx somewhat gibbous, lobes 5 spreading at length revolute obliquely oblong, anthers sessile the apices scarcely exserted, ovary with 4-5 parietal placentas. Style short, stigma clavate 5-grooved only slightly exserted. *Roxb. Fl. Ind. ed. Carey.* ii. 557.

Not uncommon on the mountainous tracts at the north-east and central parts of the peninsula.

Analysis, Pl. XV, fig. 6.

8. Transverse section of the fruit (copied from Roxburgh's drawing) shewing the 5 parietal placentas and numerous seeds.

5. GARDENIA MONTANA, *Roxb.*—A small tree with short rigid spines; bark white soft and spongy, leaves opposite or fascicled oblong obtuse nearly sessile margin revolute, glabrous and shining above, a little downy underneath, about 3 inches long by 2 inches broad, stipules annular membranaceous, flowers 3-6 fascicled at the ends of the leafless shoots, pretty large fragrant white turning to yellow very short pedicelled, calyx small with 5 teeth; corol-tube short gibbous, throat smooth, lobes 5-7 wedge-shaped marginate, anthers sessile included: stigma bifid slightly exserted, berry drupaceous roundish the size of a pullet's egg scabrous ash-colored; nut hard and bony with 4-6 parietal placentas. *Roxb. Fl. Ind.* i. 709;—*Wight Icones tab.* 577.

Common on the hills in the eastern and central parts of the peninsula, called Teligà in the Godavery forests; wood close grained and very hard.

Gardenia florida, common in our gardens, is an introduction from China.

NARGEDIA. BEDD.

Gen. Char. Flowers 4-5 merous, calyx-tube short obovate, limb with very short irregular lobes, corol-tube cylindric short hairy within, lobes rounded spreading contorted in the bud. Anthers linear sessile attached by the back just below the middle exserted, disk cushion-like, ovary 2-celled, ovules 4 in each cell pendulous, style thick, stigma large oblong exserted 2-parted or 2-sulcate, the segments erect and connivent, berry oblong ½ an inch long, 1-celled few seeded, seed more or less compressed, albumen ruminate, cotyledons ovate, radicle long cylindric. A shrub glabrous unarmed, leaves lanceolate acuminate short petioled, stipules triangular acuminate persistent, flowers small axillary, in few flowered fascicles, or solitary. Hyptianthera, *Thw. En. Zey. p.* 157, not *WA. Prod.*—*Benth. and Hook. Gen. Pl. vol.* ii. *p.* 94, under Hyptianthera (not named.)

Perhaps only a sub-genus or section of Hyptianthera.

NARGEDIA MACROCARPA, *Thw* —A shrub 8 10 feet high, leaves lanceolate or elliptic, 5 8 inches long 1½ 2½ inches broad rather coriaceous, petioles about ½ inch long, pedicels a little shorter than or about equalling the petioles, calycine segments very short rotundate apiculate, corol-tube 2 lines long, the lobes pilose about the middle, style and stigma slightly hairy Hyptianthera macro carpa, *Thw. l c.*

Ceylon, Ambagamwa, and between Galle and Ratnapoora, (the generic name is an anagram on Gardenia) Plate cccxxviii.

Analysis.

1 A flower, anthers and stigma exserted
2 A pentamerous corol opened, the tube and lobes slightly hairy inside, anthers sessile
3 A tetramerous corol opened
4, 5. Anthers, front and side view.
6 Calyx, style and stigma
7 Vertical section of the ovary, disk and calyx, ovules pendulous superposed, disk cushion-like, calyx segments very short rounded apiculate
8 Transverse section of the ovary
9, 10, 11, 12 Fruit, seed and embryo (All except Nos 3 and 9 from the pencil of Dr Thwaites,)

BYRSOPHYLLUM HOOK. F.

Gen Char Flowers polygamo-diœcious or diœcious, calyx-tube hemispherical obsolete in the male flower, limb short cupu lar entire or denticulate persistent. Corol coriaceous, tube elongate the jaws campanulate, the mouth constricted villous, lobes 4 6 patent oblong obtuse contorted Stamens as many as corol lobes and alternate with them inserted into the jaws of the corol anthers sessile affixed at the back linear-oblong apiculate included, disk annular, ovary 2-celled, style filiform, stigma fusiform or the style-branches cohering, ovules numerous in the cells immersed in the fleshy placenta which is adnate to the partition, berry ovoid or globose furnished with a rind, 2 celled many seeded, seed flattish numerous immersed in the pulp Small trees unarmed very glabrous, leaves very coriaceous turning black in drying, stipules interpetiolar large oblong acute convolute deciduous, flowers large white or rose, the male in few flowered terminal corymbs, bracteoles present, the fertile solitary terminal, berry large, about an inch or a little more each way. *Benth & Hook. Gen. Pl. p* 83.

1 BYRSOPHYLLUM TETRANDRUM, *Bedd* —A small glabrous unarmed tree, polygamo diœcious, leaves coriaceous oblong slightly attenuated at the base, quite rounded at the apex, dark green and shining above and prominently veined, pale beneath and veins inconspicuous, 2-5 inches long 1 2 inches broad, petioles ½-1 inch long, stipules large convolute, fertile flowers solitary, the male in few flowered corymbs, pedicels bracteolate, calyx limb subentire, flowers white tinged with rose, corol-lobes 4 hairy in the jaws and inside the tube in the upper portion, stigma clavate entire, fruit size of a large cherry globose smooth Gardenia tetrandra, *Bedd Icones Pl. Ind Or tab* xx See Plate cccxxvi.

Travancore, Attraymallay, 5000 feet, Muti Kuli-vayal, 4500 5000 feet, in flower in May.

Analysis.

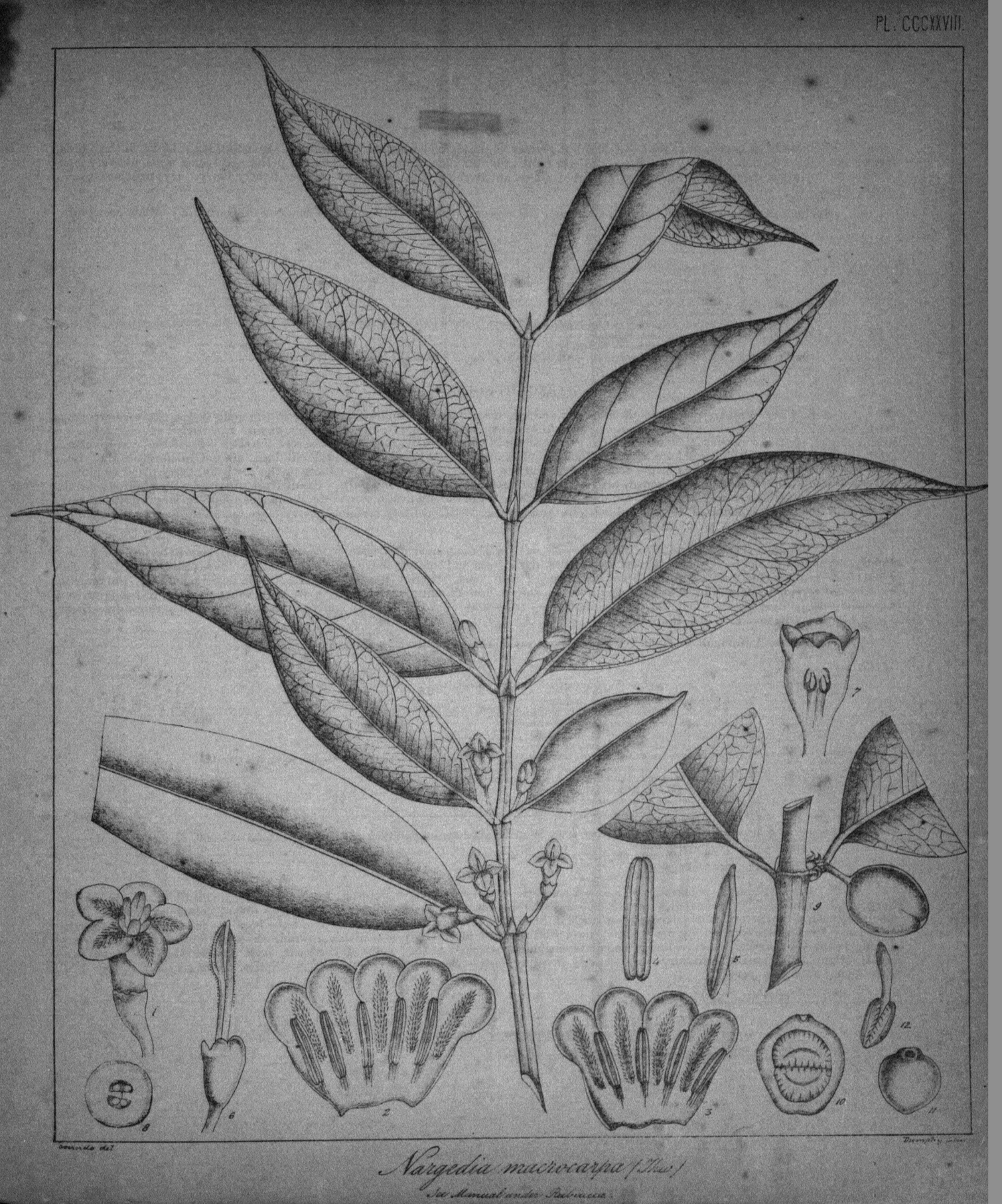
1 A branch of the male tree in flower
2 A branch of the hermathrodite tree in flower.
3. Apex of a young branch shewing stipules
4 A male flower, corol lobes contorted
5 Male calyx cut open, no ovary
6 Corol cut open, tube hairy in the jaws and within, lobes 4, stamens 4 subsessile, style and stigma
7 Hermathrodite flower, calyx-limb subentire, corol-tube shorter than in the male
8 Corol opened out, the same as in the male but with a shorter tube
9 Ovary, style and stigma
10 The apiculate anthers, front and back view.
11 Vertical section of ovary 2-celled, ovules numerous imbricate
12 Fruit not quite mature
13 Transverse sections of ripe fruit, small membranaceous partitions project a little from the walls of the fruit and partly divide the seeds
14 A seed (Drawn from dried specimens)
15 See next species

2. BYRSOPHYLLUM ELLIPTICUM, *Thw* —A small tree, 10-12 feet, very glabrous, leaves coriaceous, elliptic or oblong with a short blunt acumen, 4-10 inches long by 2 3 inches broad, petiole ½-1½ inches long, stipules large oblong acute convolute *Male* peduncles tern, pedicels tern much shorter than the leaf, bracteoles few small squamæform about the base of the pedicels, calyx tube 1 line long, limb entire or minutely denticulate, corol white, tube 1 inch long pilose within towards the apex, lobes 5 oblong obtuse ½ as long as the tube, anthers sessile linear apiculate included attached at the centre of the back, style shorter than the tube sub clavate, stigma-lobes narrow cohering, ovary entirely wanting, fertile flower not known. Coffea elliptica, *Thw. En. Pl. Zey p* 154 Stylocoryne, *Thw. l c p.* 421

Ceylon, Himidoon, at no great elevation

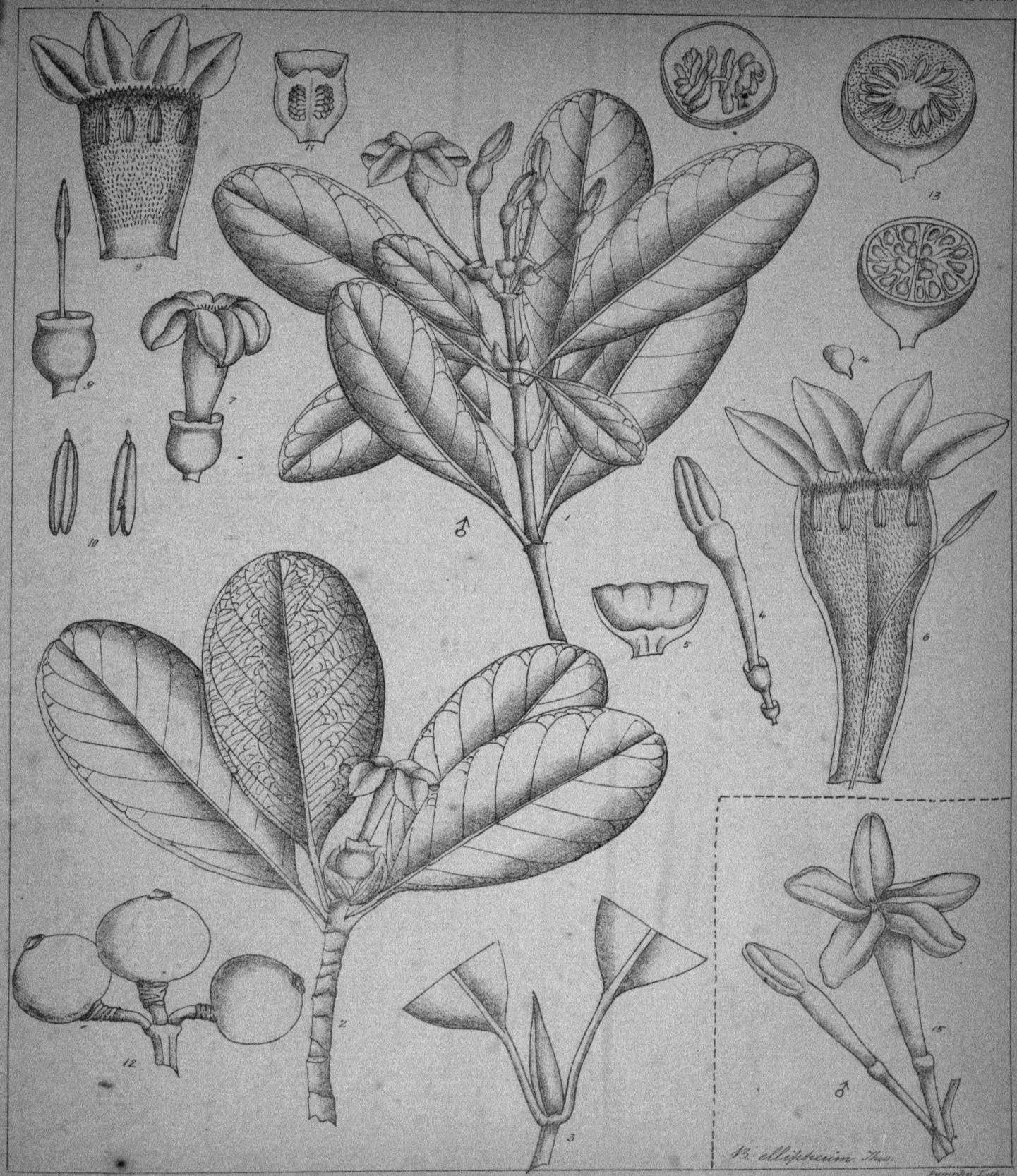
Analysis, see Pl cccxxvi.

Fig 15, Male flower and bud, corol lobes and stamens 5.



Nargedia macrocarpa (Thw.)

Sec. Manual order Rubiaceæ.



Gouendo del. Pumphry Lith.

Byrsophyllum tetrandrum (Bedd.)

See Manual under Rubiaceæ.

DIPLOSPORA. DC.

Gen. Char. Flowers generally polygamo-diœcious, sometimes calyculate. Calyx-tube short obconical or hemispherical the limb truncate or 4-5-toothed or-lobed, the segments persistent or deciduous, corol salver-shaped or funnel shaped, tube short the jaws glabrous or villous, the lobes 4-5 spreading short or subelongate contorted, stamens as many as the corol lobes inserted into their jaws, filaments thick short or elongate, anthers subbasifixed exserted oblong or rarely linear subulate obtuse or acute often recurved, disk tumid, ovary 2-very rarely 3-celled, style short or elongate glabrous or hirsute the branches oblong or linear, ovules 2-8 in each cell inserted on a placenta adnate to the centre of the partition collateral or in 2-series, berry ovoid or globose 2-celled, cells several seeded. Seed imbricate variously compressed and angled, testa celluloso-coriaceous or membranaceous, albumen fleshy, embryo small, cotyledons orbicular, radicle terete elongate. Trees or shrubs, glabrous or sparingly puberulous, flowers small green or whitish inconspicuous axillary fascicled or in cymes, bracts sometimes involucellate, *DC. Prod.* iv. 477 ;—*Benth. & Hook. Gen. Pl.* ii. *p.* 96. Discospermum, *Dalz. in Hook. Kew Journ.* ii. 257.

1. Diplospora apiocarpa, *Dalz.*—For description, &c. see Plate ccxxiii.

In the description, between the words *substance* and *glabrous*, insert *Corol.*

I am not quite sure that this is Mr. Dalzell's species, as the frut is quite globose, the flowers are fully 6 lines in length.

2. Diplospora sphærocarpa, *Dalz. l. c* ?—Leaves 3-4 inches long by 1½-2 inches broad shining above otherwise like the preceding but with smaller flowers and the calyx deeply 4-lobed. Discospermum Dalzellii, *Thw. En. Pl. Zey. p.* 158.

Tinnevelly ghats and in Ceylon 1000-3000 feet elevation. My Tinnevelly specimens quite correspond with specimens sent by Dr. Thwaites under the name of Discospermum Dalzellii ; if it is Dalzell's plant it also occurs on the Bombay ghats.

3. Diplospora erythrospora, *Thw.*—A tree, polygamo-diœcious, leaves 2-5 inches long, 1-2½ inches broad, petiole 1½-3 lines long. Calyx campanulate minutely 4-toothed, flowers yellowish-white, stamens rather long, ovary cells 3-4 ovulate, ovules irregularly inserted in 2 series, berry small (4 lines in diameter) ovoid or subspherical, seeds 3 lines long oblong, testa rather thick fibrous reddish-glandulose. Discospermum, *Thw. En. Pl. Zey. p.* 158.

Ceylon, Ambagamwa district, at an elevation of 3000 feet.

Tribe VI, Retiniphylleæ.—*Corol contorted ; ovary 5-7-celled, cells 2-ovuled, drupe with 5-7 one-seeded pyrenes.*

SCYPHIPHORA. Gærtn.

Gen. Char. Calyx-tube elongato-obconical, limb cupular truncate minutely 4-5 toothed persistent. Corol-tube cylindrical, pilose in the jaws, lobes 4-5 oblong patent or recurved contorted. Stamens as many as the corol lobes and inserted between them, filaments short subulate, anthers fixed below the middle of the back, linear saggittate, disk annular lobate, ovary 2-celled (but each cell divided by a spurious dissepiment into 2 superposed ones), cells narrow, style filiform, the branches linear obtuse. Ovules 2 in each cell inserted at the middle of the partition, the upper one erect, the lower pendulous ; drupe oblongo-cylindric 10-sulcate with 2 pyrenes which are scarcely separable each with 2 superposed one-seeded cells or fewer by abortion, seed oblongo-cylindric a little curved, testa membranaceous, albumen scanty, cotyledons oblong, radicle long. A glabrous shrub, stipules interpetiolar broad and short, flowers small in pedunculate axillary cymes. Epithinla, *Jack.*

1. Scyphiphora hydrophylacea, *Gærtn.*—A shrub quite glabrous, young shoots resinous, leaves obovate very obtuse narrowed into a rather long petiole, 1½-2¾ inches long coriaceous smooth and shining ; cymes dense very shortly pedunculate ; corol-tube 1½-2 lines long, lobes rather obtuse, drupe oblong crowned with the calyx-limb 3-4 lines long. *Gærtn. Fruct.* iii. 91. *t.* 196. Epithinia Malayana, *Jack* ;—*WA. Prod.* 424.

Ceylon, Jaffna, tidal back-waters, also in Australia and the Malay Peninsula, but I am not aware that it has been found on the coasts of this presidency.

Analysis, Pl. XXIX, fig. 5.

(Under the name of Scyph. Malayana, which should be altered as above.)

1. Portion of a branch in flower.
2. A flower bud, calyx truncate minutely toothed, corol lobes contorted.
3. A flower, corol-lobes 5.
4. Corol opened out hairy in the jaws, corol-lobes 4, stamens 4 between the lobes (sometimes lobes and stamens 5.)
5. Anthers, front and back view, a long apiculation at the apex.
6. Ovary, style and stigma.
7. The 10-ribbed oblong cylindric drupe much magnified ; it contains 2 pyrenes. (Drawn from dried specimens.)

Tribe VII, Guettardeæ.—*Corol-lobes imbricate or valvate never contorted. Stamens inserted in the jaws of the corol, ovary 2-many-celled, ovules solitary anatropal pendulous from the apex of the cell, funicle thickened, raphe dorsal with a superior micropyle ; drupe with 2-many-pyrenes or the putamen 2 many-celled rarely with 2 cocci, seed terete pendulous from the apex of the cell, the funicle closing the orifice of the cell, albumen 0 or scanty, embryo elongate cylindric, radicle superior. Trees or shrubs, inflorescence axillary.*

GUETTARDA. Linn.

Gen. Char. Calyx-limb truncate or irregularly toothed. Corolla-tube cylindrical, lobes 4 or more, imbricate in the bud. Anthers included in the tube. Ovary 4-or more-celled, with 1 pendulous ovule in each cell ; style with as many linear lobes as cells of

the ovary. Fruit a drupe with a hard several-celled nucleus. Seeds solitary in each cell, oblong cylindrical or curved, funiculus thick closing the orifice of the cell ; testa thin, albumen none or very thin, embryo the shape of the seed, the cotyledons not broader than the superior radicle. Trees or shrubs, often tomentose. Stipules interpetiolar, broad acuminate deciduous. Flowers sessile along the branches of a forked cyme, pedunculate in the axils. Cadamba, *Sonner. Voy.* ii. 228. Matthiola, *Linn. Gen.* 1231. Halesia, *R. Br.* Dicrobotryum, *Willd.* Langieria, *Jacq. St. Amer.* Donkelaaria, *Lemaire.*

1. GUETTARDA SPECIOSA, *Linn.*—A coarse shrub, or small tree, the young branches thick, often flattened, gummy and glabrous or tomentose. Leaves shortly petiolate, broadly obovate-orbicular or ovate, very obtuse, rounded or slightly cordate at the base, 6 to 10 inches long or even more, glabrous above, softly pubescent tomentose or nearly glabrous underneath. Flowers large, in rather dense cymes. Calyx-limb truncate deciduous, 1 to 1½ lines long. Corolla-tube above 1 inch, sometimes 1½ inch long ; lobes 4-9, oblong obtuse not ½ inch long. Ovary-cells 4-9, usually 5 or 6. Drupe nearly globular, attaining 1 inch diameter, chiefly consisting of the very hard woody endocarp, more or less lobed, the interstices filled with a hard fibrous mesocarp, the cells and seeds small and curved. *Wight Ic. t.* 40 ;—*Bot. Reg. t.* 1393.

Ceylon, near Galle and Cultura, called Nil pitcha ; I have never seen it in this presidency in a wild state, but it is frequent in gardens ; it also extends to Australia and the sea coasts from East Africa to the Pacific.

Analysis, Pl. XVII, fig. 2.

1. A flower bud, corol-lobes imbricate.
2. A full flower.
3. Corol removed and opened out.
4. A flower, the corol removed and the calyx opened to show the disk, style and stigma.
5. The sessile anthers, front and back view.
6. Ovary cut vertically, showing the pendulous ovules.
7. Ovary cut transversely, shewing 5 cells.
8. A fruit.
9. The same cut vertically.
10. A lobe of a corol.
11. Branch of the inflorescence in bud.

TIMONIUS. RUMPH.

Gen. Char. Calyx limb truncate or irregularly toothed, corol-tube cylindrical, lobes 4 or more short thick obtuse with a central rib prominent inside, the margins subimbricate or valvate. Anthers included in the tube. Ovary (normally 5 to 10-celled with several ovules to each cell) divided by spurious dissepiments between the ovules into very numerous 1-ovulate cells, superposed in several irregular rows. Style divided into about 5 to 10 linear lobes. Fruit a drupe, with exceedingly numerous oblongo-linear 1-seeded pyrenes, closely packed and diverging in many rows from the axis. Seeds of *Guettarda.* Trees or shrubs. Stipules membranous, so deciduous as to be rarely seen. Flowers polygamo-diœcious, on axillary peduncles, the females (with small or imperfect stamens) usually solitary, the males (with an abortive ovary) 3 or more together, sessile in the forks or along the branches of pedunculate cymes. *Rumph. Amboin.* iii. 216 *t.* 140. Eupyrena, *Wight. and Arn. Prod.* 422. Pyrostia, *Roxb. Fl. Ind.* i. 388. not *Comm.* Erithalis, *Forst.* not *Linn.* Porocarpus, *Gœrtn. Fr.* ii. 473. Helospora, *Jack.* Polyphragmon, *Desp.* Burneya, *Cham. and Schlecht.* Nelitris, *Gœrtn. de Fruct.* i. *p.* 134. *t.* 27. (*excl. syn.*)

1. TIMONIUS JAMBOSELLA, *Gœrtn.*—A very small tree or large shrub polygamo-diœcious, young parts and young leaves strigosely hairy, leaves elliptic lanceolate acuminate entire, 3-7 inches long by 1¼-2½ broad glabrous in age except the costa beneath and the hairy glands in the axils of the primary veins, petioles 6-9 lines long. Stipules hairy on the back ovate acuminate 3-4 lines long. Flowers male on one tree and hermathrodite on another, yellowish white, lobes fleshy subimbricate. *Male* peduncles axillary opposite springing from within the stipules, ½-1½ inches long bifurcate with a flower in the fork, the branchlets few-flowered, flowers subsecund, corol infundibuliform hirsute outside sulcate within. Stamens 4 attached by the middle of the back by a very short filament which does not extend nearly to the base of the lower lobe, style hairy especially towards the apex, stigma minute entire ; *hermathrodite* peduncles axillary 1-flowered 1½ inches long, flowers articulate bibracteolate at the base ; corol-lobes more fleshy than in the male each lobe most prominently 3-sulcate on the inside, filaments much longer than in the male (extending below the lower lobe of the anther), ovary about 12-celled. Style 2-cleft at the apex each arm with 2 entire stigmas. Eupyrena jambosella, *WA. l.c.* Timonius jambosella, *Bedd. Icones. Pl. tab.* cxc.

Ceylon, up to 5000 feet elevation, very common about Badagam near Galle in the south of the island : also in the Peninsula southern districts ?

Analysis, Pl. XVI, fig. 4.

1. A branch of the hermathrodite tree in leaf and flower.
2. Hermathrodite flower, the thick lobes of the corol slightly imbricate.
3. Ovary cut vertically shewing the long cells, style and stigmas, the 4 stigmas or style branches each slightly bifid. (Thwaites described them as trifid, and in dissections that I made in Ceylon for my *Icones* I found them entire. Vide tab. cxc in my *Icones.*)
4. A young fruit.
5. Ovary cut transversely, shewing 13 cells.
6. Young fruit cut vertically.
7. Young fruit cut transversely, 12 cells.

7*a*. The cylindric or slightly curved seed with its thick funicle, which closes the orifice of the cell.

8. A flowering branch of the male tree.

9. A male flower.
10. Corol opened out, the 4 fleshy lobes sulcate within but not quite so prominently as in the hermathrodite.
11. Anthers, front view.
12. Anthers, side view.
13. Calyx and style of the male flower, the style slightly 2-cleft (I found it quite entire in flowers that I dissected.) All from a drawing communicated by Dr. Thwaites.

DICHILANTHE. Thw.

Gen. Char. Flowers aggregated in a globose head. Calyx tube elongato-oblong curved, limb oblique shortly funnel-shaped 5-cleft to the middle, the segments rigid lanceolate acuminate persistent with 5 intermediate scales. Corol funnel shaped sericeous the tube curved, the jaws villous, limb shortly bilabiate, the upper lip 2-the lower 3-toothed, lobes valvate. Stamens 5 inserted into the corol jaws, filaments short. Anthers fixed by the back at the base oblong produced and truncate at the base subacute at the apex, included, disk contracted elevated truncate crenulate hollowed out at the apex. Ovary 2-celled, cells narrow, style stout much exserted, stigma clavate subquadrate 2-lobed, ovules solitary in the cells pendulous from the apex elongato-cylindric, the funicle thickened, fruit thickly coriaceous obovoid gibbous at the back 2-celled crowned by the rigid calyx-limb, seed elongate cylindric narrower than the subglobose funicle, albumen fleshy. Rigid trees, ramuli opposite divaricate terete, the nodes and young parts resinous, leaves opposite petiolate rigidly coriaceous elliptico-lanceolate acuminate, above finely reticulated between the arcuate slender primary veins, beneath obscurely veined, stipules connate into an intrapetiolar short ring, capituli terminal globose in fruit, sessile or shortly pedunculate the peduncle dilated at the apex, flowers sessile small about 6-10 in each head chiefly verticelled round the margins with a few central. *Thw. in Hook. Kew Jour.* viii. 269, *et* 376, *t.* 8-*A* ;—*Benth. and Hook. Gen. Pl.* ii. *p.* 103.

1. Dichilanthe Zeylanica, *Thw.*—A tree 40-50 feet high, leaves 3-7 inches long by 1½-2½ inches broad, flower heads shortly pedunculate.

Ceylon, in forests between Galle and Ratnapoora at 1000 feet elevation. For Analysis, see Pl. XV, fig. 4, and Manual page cxxiv.

This tree has been described under Caprifoliaceæ at page ccxxiv. of the Manual, but must be excluded from that Order as it belongs to Rubiaceæ.

Tribe VIII, Vanguerieæ.—*Corol lobes valvate, stamens inserted into the corol jaws. Ovary 2 many celled, ovules solitary anatropal fixed above the middle of the cells pendulous, raphe dorsal, micropyle superior, drupe with 1-many pyrenes or a 1-many-celled putamen. Seed various, albumen copious, cotyledons generally compressed broad, radicle superior. Trees or shrubs, inflorescence axillary.*

PLECTRONIA. Linn.

Gen. Char. Calyx-tube short obconical turbinate or hemispherical, limb very short cupular or annular truncate or 4-5-toothed, generally deciduous. Corol-tube short or cylindrical often furnished with a ring of hairs within, lobes 4-5 valvate in the bud reflexed in age. Stamens as many as the corol lobes exserted or rarely included, filaments none or short, anthers fixed by the back at the base, disk annular tumid or depressed, ovary 2-celled with 1 ovule in each cell laterally attached near or at the top. Style much exserted and flexuose or included. Stigma thick ovoid or mitre-shaped entire or 2-lobed, drupe didymous or globose and compressed with 2 or rarely 3 one-seeded pyrenes, or by abortion with only 1 pyrene, pyrenes crustaceous or bony. Seed large pendulous oblong, testa membranaceous, albumen fleshy, embryo elongate terete, cotyledons short, radicle superior. Trees or shrubs unarmed or spinose, stipules interpetiolar pointed with a broad base, flowers in axillary cymes or clusters. *Linn. Mant.* 6. Canthium. *Lam. Dict.* i. 602. Psydrax, *Gærtn. Fruct.* i. 125. *t.* 26. Dondisia, *DC. Prod.* iv. 469. Mitrastigma, *Harv. in Lond. Journ.* i. 20. Psilostoma, *Klotzsch.* Phallaria, *Schum. et Thonn.*

1. Plectronia didyma, *Gærtn.*—For description, &c. see Plate ccxxi (under the name Canthium)

Plectronia montana, *Thw*, is, I believe, only a variety of this species.

2. Plectronia parviflora, *Roxb.*—A scraggy thorny shrub, trunk scarcely any, branches numerous spreading, thorns simple opposite above the axils spreading cross armed very strong and sharp, sometimes 3-fold leaves on the young shoots opposite on the older branches fascicled, short petioled reflexed ovate entire smooth variable in size, racemes short axillary few flowered, flowers tetramerous yellowish, calycine teeth small ovate acute or oblong and somewhat foliaceous, corol-tube glabrous short downy in the mouth. Style a little longer than the corol-tube, stigma somewhat globose often more or less bifid or marked with a longitudinal furrow, drupe obcordate compressed furrowed on each side, as large as a cherry, crowned with the remains of the calyx, fleshy yellowish smooth 2-celled, pyrenes oblong. Canthium parviflorum, *Roxb. Fl. Ind. ed. Wall, vol.* ii. *p.* 170.

A very common bush, much used as a hedge plant, called Balsu in Teligoo ; the wood is very hard and in use for turnery purposes ; the leaves are eaten in curries.

3. Plectronia Rheedii, *DC.*—A shrub armed with supra-axillary thorns, branches hirsute, leaves oval to ovate or lanceolate acuminate very shortly petioled, shining above furnished with hairs in the axils of the veins beneath, flowers 5-merous axillary few shortly pedicelled fascicled or in very short racemes, calycine teeth minute, corol acuminated in the bud tube shortly campanulate, lobes acuminate, stigma mitriform, drupe obovate emarginate. Canthium Rheedii, *DC. Prod.* iv. 474.

A most variable species. Common in moist forests on the western side of the Presidency and in Ceylon ; the leaves are generally quite rounded or cordate at the base, about 2 inches long and 1½ broad ; one variety from the Wynaad has the leaves 5 inches long and 2½ broad, another variety from 5000 feet on the Travancore hills has linear lanceolate leaves 10-15 lines long by 3-6 lines broad ; it has glabrous stems, rather stout slightly recurved thorns 2 lines in length and very minute flowers ; this I have named var. *c.*

linearis, but it is probably a distinct species. Dr. Thwaites' var. δ. is also perhaps a distinct species, the thorns are very slender quite straight and about 5 lines long, the stems hairy, the leaves very small and generally quite ovate and the flowers very large.

4. PLECTRONIA LESCHENAULTII, *DC.*—A shrub, glabrous, old branches armed with short supra-axillary thorns, young shoots long slender often unarmed, petioles shortish twisted, leaves opposite or 3-4-verticellate oblong much acuminate acute at the base, cymes axillary short peduncled 3-5 flowered, flowers pentamerous, corol acuminate in the bud, tube campanulate with a ring of reflexed hairs inside, lobes linear lanceolate acuminate reflexed, anthers exserted at length reflexed, style thickened about the middle and hairy downwards, stigma mitriform bifid to about the middle, drupe obcordate. Dondisia Leschenaultii, *DC. Prod.* iv. 469. Canthium Leschenaultii, *WA. Prod.* 426.

A common shrub in our western jungles.

5. PLECTRONIA NEILGHERRENSIS, *Wight.*—A small tree unarmed, branchlets obtusely 4-sided glabrous, leaves short petioled ovate bluntly acuminate membranaceous, 4-5 inches long by about half as broad, glabrous or sub-glabrous above slightly hairy beneath, peduncles axillary about as long as the petioles bearing a small umbel of several flowers furnished with subulate bracts, flowers 5-merous small white, very hairy in the throat, calyx limb truncate 5-toothed Stamens short nestling in the hairs, ovary 2 celled, stigma capitate, drupe glabrous obovate succulent compressed cream-colored. Canthium Neilgherrense, *Wight Icones tab.* 1064.

Common on the Nilgiris about Sisparah 5000-6000 feet elevation, and on the Travancore hills (Aghasteer) at about 5000 feet.

Analysis.

For Analysis of the fruit, seed and embryo, see Plate ccxxi, fig. A.

6. PLECTRONIA MACROCARPA, *Thw.*—Shrubby subscandent thorns axillary very stout recurved, branches terete rufo-pilose when young glabrous in age, leaves ovate acuminate, 1½-3 inches long by ¾-1½ broad densely rufo-pilose beneath particularly on the prominent veins, sparingly pilose above, petioles 2-3 lines long pilose, cymes pilose solitary in the axils, the peduncles 6-8 lines long, flowers numerous on the dichotomous branchlets with a single one in the fork, brownish-white rounded at the apex in the bud, 5-merous, calyx minutely toothed, corol about 3 lines long contracted above the tube when in bud, the lobes lanceolate a little hairy on the outside at length reflexed and a little longer than the tube, tube pilose within. Stamens exserted, style hairy much exserted, stigma thick ovoid entire sulcated, drupe roundish rather compressed emarginate 1 inch long, seeds tuberculate. Canthium macrocarpum, *Thw. En. Pl. Zey. p.* 152 ;—*Bedd. Icones Pl. tab.* ccxxxviii.

Ceylon, Hantani, at 3000 feet elevation.

7. PLECTRONIA CAMPANULATA, *Thw.*—Shrubby subscandent thorny, branchlets terete pilose, leaves glabrous rounded ovate or lanceolate obtusely acuminate apiculate 5-14 lines long by 3-8 lines broad, petioles 1-1½ lines long, fascicles 1-4 flowered axillary, the pedicels glabrous slender 3-4 lines long, flowers 5-merous, calyx glabrous minutely toothed, corol campanulate acute in the bud constricted at the middle, the lobes and tube each about 2 lines long the latter pilose at the base, anthers a little exserted, style conical, stigma obconical truncate at both ends undivided, drupe the size of a pea obcordate compressed, seed tuberculate. Canthium campanulatum, *Thw. En. Pl. Zey. p.* 153.

Ceylon, Deltotte, in the central provinces, at an elevation of 3000 feet.

8. PLECTRONIA TRAVANCORICA, *Bedd.*—A middling sized tree unarmed, branches terete glabrous. Stipules with a long subulate point (5 lines long) from a broad base, leaves ovate with a bluntish acumination glabrous membranaceous, about 2 inches long by 1 inch broad, much paler beneath, petioles 6-8 lines long, cymes glabrous slender many-flowered axillary or from tubercles at the axils solitary or several together shorter than the leaves, pedicels elongate and slender, flowers 4-merous very small rounded in the bud campanulate, calycine teeth subulate persistent the tube and lobes of the corol each 1-1½ lines long, tube with a ring of hairs in its jaws, lobes ovate scarcely acute, stamens exserted, style much exserted glabrous, stigma globose sulcate, fruit not seen. *Bedd. Icones Pl. tab.* ccxxxix.

I have only met with this tree on the Travancore and Tinnevelly ghats.

Tribe IX, IXOREÆ.—*Corol lobes contorted. Stamens inserted in the jaws or mouth of the corol, ovary 2-(rarely 3-4-) celled, ovules solitary in the cells anatropal or amphitropal, fixed at the middle or above the middle very rarely at the base of the cell, fruit baccate or coriaceous 2-4-celled or with 2-4 pyrenes pyrenes coriaceous, or rarely only 1-celled, seed flat on the inner face or concave, albumen horny, embryo curved small or middle sized, cotyledons flat broad, radicle terete inferior. Trees or shrubs, stipules entire.*

IXORA. LINN.

Gen. Char. Calyx-tube ovoid, limb short 4-rarely-5-toothed persistent, lobes short or subelongate, corol hypocrateriform, tube slender cylindrical naked or hairy in the jaws, the lobes 4 (rarely 5) shorter than the tube spreading, contorted in the bud. Stamens 4 (rarely 5), filaments short or none, anthers fixed by the back linear or oblong, generally acuminate, erect, exserted or semi-exserted, disk fleshy tumid, ovary 2-celled, style filiform with 2 short exserted patent or recurved arms which are rarely connate, ovules solitary in the cells, peltately attached to the middle of the partitions, amphitropal, micropyle inferior, berry fusiform coriaceous or fleshy with 2 pyrenes, which are chartaceous with the inner face concave or sometimes flat and the back convex. Seed in shape like the pyrene, umbilicus ventral, testa membranaceous, albumen cartilaginous, embryo dorsal incurved, cotyledons foliaceous, radicle terete inferior. Shrubs or trees, leaves opposite or rarely verticelled in threes, stipules interpetiolar acuminate from a broad base persistent or deciduous, flowers in terminal dense or large corymbs or panicles, or rarely in axillary or lateral cymes white rose or scarlet. Siderodendron, *Schreb. Gen.* 71. Sideroxyloides, *Jacq. Stirp. Am.* 19. *t.* 175. *f.* 9.

1. IXORA PARVIFLORA, *Vahl.*—For description, &c. see Pl. ccxxii.

2. Ixora barbata, *Roxb.*—A small tree glabrous, leaves oblong suddenly and obtusely pointed glabrous and shining, the primary veins very prominent, 6-9 inches long by 3½-4 broad, corymbs terminal longer than the leaves the peduncle furnished below the middle with a large pair of nearly orbicular cordate pointed or emarginate floral leaves or bracts, 1½-2 inches each way, the true bracts at the base of the branchlets of the corymbs linear small, flowers very numerous, rose colored, calyx-segments subfoliaceous, corol-tube long and slender, berry red smooth size of a pea. *Roxb. Fl. Ind. ed. Wall.* i. *p.* 394 ;— *Wight Icones tab.* 185.

A very common tree in the mountain forests on the west side of the presidency up to 4500 feet elevation.

3. Ixora calycina, *Thw.*—A small tree, glabrous, leaves ovate or lanceolate acuminate, rounded cordate or acute at the base, 1½-4 inches long by ½-2 inches broad, the primary veins sub-horizontal, petioles 1-2 lines long, corymbs terminal trichotomous, pedicels short crowded, bracteoles long linear, calyx-segments entire lanceolate acute 3-5 times longer than the ovary, corol white with a tint of red, the lobes oblongo-rotundate acute, anthers with short filaments, berry ovoid or spherical crowned with the calyx. *Thw. En. Pl. Zey. p.* 155 ;—*Bedd. Icones Pl. tab.* xcvii.

Ceylon, central provinces, up to 7000 feet elevation.

4. Ixora jucunda, *Thw.*—A small tree 10-20 feet high, leaves glabrous lanceolate or ovato lanceolate acuminate, 4-8 inches long by 1-4 inches broad, petioles 2-5 lines long, corymbs reddish terminal pilose many-flowered trichotomous at the base primary divisions elongate, bracteoles small acute, calyx segments truncated shorter than the ovary, corol white tinted with red, lobes about 2 lines long oblong rather acute, tube from 2-3 lines in length in one variety to 7-14 lines long in another, berry subspherical blackish red. *Thw. En. Pl. Zey. p.* 155 ;—*Bedd. Icones Pl. Ind. tab.* xcvii.

Ceylon, up to 4000 feet elevation.

5. Ixora polyantha, *Wight.*—A large shrub, glabrous except the inflorescence, leaves elliptic oblong obtuse or slightly acuminate, 8-16 inches long by 4-7 inches broad, corymbs densely hairy terminal contracted many-flowered, flowers numerous, corol tube densely hairy, the lobes ovate lanceolate acuminate and glabrous as are the scariose bracts, corol glabrous, tube long slender, the lobes obtuse reflexed. *Wight Icones tab.* 1066.

Very common in South Canara and Malabar ; a very beautiful shrub that ought to be introduced into our gardens.

6. Ixora coccinea, *L.*—A very beautiful shrub with scarlet flowers so common in our gardens, is abundant in the jungles of our western coast in the vicinity of the sea. 7. Ixora acuminata, *Roxb.* ; *Wight Icones tab.* 706, 8. Ixora nigricans, *Br.* ; *Wight. Icones tab.* 318, and 9. Ixora lanceolata, *Coleb.* ; *Wight. Icones tab.* 827, are small shrubs found in our western mountain jungles.

PAVETTA. L.

Gen. Char. The same as that of Ixora, except that the style is generally longer and more slender, with the stigma fusiform or clavate and undivided or 2-toothed, the stipules are often connate in a loose sheath and the placentas more tumid ; the 2 genera have lately been joined by some botanists, but Bentham and Hooker keep them distinct in their new Gen. Pl. Crinita, *Houtt.* Baconia, *DC.* Verulamia, *DC.*

1. Pavetta Indica, *Linn.*—A small tree or good sized shrub, leaves oval oblong acuminated short petioled glabrous on both sides or somewhat puberulous beneath shining above, 4-6 inches long by 2-2½ broad, stipules broad, upper ones often connate at the base, corymbs compound their primary branches opposite the peduncles and pedicels smooth terete, flowers white fragrant generally 4-merous rarely 5-merous, in bud gradually thicker upwards, calyx-segments minute obtuse, corol lobes oval obtuse 2-3 times shorter than the tube, style twice as long as the corol glabrous, stigma clavate hispid, berry globular size of a pea. *Linn. Sp. p.* 160. Ixora Pavetta, *Roxb. Fl. Ind. ed. Wall.* i. *p.* 395.

Common throughout India and Ceylon, and also in the Archipelago and in Queensland.

2. Pavetta tomentosa, *Roxb.*—A small tree or large shrub, leaves oblong to ovate pointed ventricose downy on both sides, 4-8 inches long by 3-5 inches broad, corymbs dense, the whole inflorescence and calyxes tomentose or hoary pubescent, flowers numerous white fragrant, calyx-limb small with minute teeth, corol fruit seeds as in Pavetta Indica. *Roxb. Fl. Ind. ed. Wall.* i. 396. Pavetta Brunonis, *Wall.* ;—*Wight's Icones tab.* 1065. P. Rothiana, *DC. Prod.* iv. 491. P. hispidula, *WA. Prod.* 431.

Not uncommon throughout the presidency, Ceylon and North Australia ; the Ceylon plant has long narrow calyx-segments, and as far as my specimens go it appears to have smaller and narrower leaves, so that it may prove a distinct species ; but the calycine segments are also subject to variation in the next species.

3. Pavetta breviflora, *DC.*—A large shrub, leaves oval acute at the base acuminated short petioled submembranaceous furnished with numerous dark glands glabrous turning black in drying, corymbs short dense many flowered glabrous, calyx-segments minute glabrous or rather enlarged and ciliate, corol tube about 3 lines long scarcely longer than the lobes, style not much exserted. *DC. Prod.* iv. 491 ;—*Wight's Icones tab.* 1035.

Common in woods on the higher ranges of the Nilgiris.

4. Pavetta involucrata, *Thw.*—A large shrub 10-12 feet high turning black in drying, leaves glabrous shining above obovate or obovato-lanceolate shortly acuminate, the base narrowed rounded or acute, 2½-5 inches long by 1-2 inches broad, petioles 36 lines long, flowers glomerate in solitary axillary pedunculate heads furnished with an involucre, the peduncle about 1 inch long, the involucre leafy, the scales membranaceous pilose on the inside ; calyx-segments linear pilose within about as long as the tube, corol white the lobes acute nearly as long as the tube, style twice as long as the corol slightly pilose at the apex, stigma minutely 2-toothed, berry spherical as large as a pea black. *Thw. En. Pl. Zey. p.* 156 ;—*Bedd. Icones tab.* c.

Ceylon, central provinces, at 5000-7000 feet elevation.

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Analysis, Pl. XXIX., fig 6.

1. Portion of a branch shewing stipules.
2. A flower, the contorted corol-lobes just opening.
2a. A full flower, anthers exserted.
3. Corol cut open to shew the insertion of the stamens, jaws hairy.
4. Anthers, front and back view.
5. Calyx, ovary, style and stigma, the latter slightly 2-toothed.
6. The 2 celled ovary cut vertically, ovules solitary attached to the centre of the axis.
7. A bunch of fruit or berries.

5. PAVETTA SIPHONANTHA, *Dalz*—Is a very beautiful small shrub common in the Wynaad, Coorg, Canara, &c., its very large flowers make it a most desirable plant for cultivation. From this 6. PAVETTA ANGUSTIFOLIA, *Thw.*, figured in Plate xcix of my *Icones*, does not differ in any way except in its much narrower and smaller leaves, and it must, I think, be only considered a variety. I have the same or a very similar form (differing only in the leaves being of a much paler color and the flowers a little smaller) from the Coorg and Tinnevelly mountains; I have 2 other shrubs so closely allied to Dalzell's Siphonanthus, that I hardly like to consider them as distinct species: the first of these has the young stems pilose or almost scabrous, the leaves pilose beneath, pentamerous flowers, and the style included! and glabrous; this I have collected on the northern and western slopes of the Nilgiris (Ouchterlony Valley and Sispara ghat) and on the Perna peak in Wynaad. (7. PAVETTA NILAGIRICA, *Bedd. in distr.*) the 2nd is glabrous throughout, the flowers pentamerous fewer and rather larger but with a shorter thicker tube than in typical siphonanthus, the style stout hairy in its lower half, not much exserted (corol tube 1 inch, style 1¾ inch long); this I have only found on the South Canara ghats. (8. PAVETTA CANARICA, *Bedd. in distr.*)

Coffea alpestris, Wight, and Coffea grumelioides, Wight. (Wight's Icones plates 1040 *and* 1041*) two shrubs common on the Nilgiris should, from their general habit and terminal inflorescence, rather find a place in this genus than in Coffea; if referred to Coffea on account of the short corol-tube and short style, Pavetta brevifloa would also have to be removed to that genus; Pavetta however is described as rarely having axillary inflorescence, and if this is the case, the difference between the 2 genera is obscure and confined to the seed and its testa. I have not seen the ripe fruit of these 2 shrubs, so cannot say whether the seeds have the longitudinal furrow on their inner face and the intruding testa.*

COFFEA. LINN.

Gen. Char. Calyx tube short subcylindrical oblong or turbinate, limb persistent short truncate, toothed or lobulate, often glandulose within or the teeth glandulose, corol hypocrateriform or infundibuliform, the tube short or elongate, the jaws glabrous or villous, the lobes 4-5 oblong spreading, contorted in the bud. Stamens 4-5 inserted into the jaws of the corol, filaments short or none, anthers fixed by the back near the base, linear obtuse or acute included or exserted, often in age recurved or twisted, disk tumid, ovary 2-celled, style filiform or thick glabrous, the branches 2 linear or subulate, ovules solitary in the cells subpeltately affixed to the middle (rarely higher) of the partition, berry globose or oblong dry or fleshy with 2 pyrenes, pyrenes coriaceous or chartaceous convex on the back, the inner face flat with a longitudinal furrow, seed of the same shape, umbilicus ventral, testa membranaceous intruding into the furrow of the putamen, albumen horny, embryo dorsal curved, cotyledons foliaceous cordate, radicle elongate terete inferior. Shrubs, generally glabrous, leaves opposite or rarely verticelled in threes membranaceous or subcoriaceous sessile or petioled, stipules broad acuminate persistent, flowers glomerate in the axils of the leaves sessile or shortly pedicellate white often fragrant, pedicels bracteolate. *Linn. Gen. n.* 230.

1. COFFEA ARABICA, *L.*—A large shrub or small tree. Stipules on both sides solitary entire, leaves oblong-ovate acuminate glabrous, peduncles axillary short aggregated, calyx-limb not increasing after flowering, corol 5-cleft glabrous in the throat, anthers linear entirely exserted, style exserted. Stigma bipartite with the lobes linear, berry ovate. *DC. Prod.* iv. 499.

Introduced from Arabia, and now very common in a cultivated state on the west side of the Presidency, and run wild in some of our forests.

Analysis, Pl. XVII., fig. 1.

1. Portion of a branch in leaf and flower.
2. Axillary fascicle of flowers, corol-lobes contorted.
3. A full flower.
4. Corol removed and opened out, showing the stamens.
5. Anthers, front and back view.
6. A flower, the corol removed shewing the style and stigma.
7. Ovary cut vertically, shewing the solitary ovules attached to the centre of the axis.
8. Ovary cut transversely, 2 cells.
9. Ripe fruit.
10. The fruit opened lengthways, shewing 2 seeds.
11. A ripe seed.
12. The same, side view.
13. Seed cut vertically.
14. Seed cut transversely.

2. COFFEA BENGHALENSIS, *Roxb*, (C. Wightiana, *Wall.*; C. Travancorensis, *WA.*) *Wight Icones tab.* 1598.—Is a very small shrub found (though not common) throughout the Presidency and in Ceylon.

Tribe X, MORINDEÆ—*Corol-lobes valvate. Stamens inserted into the mouth or jaws of the corol, ovary 2-or imperfectly (rarely perfectly) 4 celled, ovules solitary in the cells, or in the imperfectly 4-celled ovaries (Morinda) twin, anatropal or amphitropal fixed at the*

middle or below the middle of the cell, raphe dorsal, micropyle inferior, fruit baccate or drupaceous 2-4 celled or with 2-4 pyrenes, seed various, umbilicus ventral or subbasal, albumen horny, embryo straight or curved, cotyledons linear or plane, radicle terete inferior or excursive. Trees or shrubs, erect or scandent, stipules solitary on each side entire or rarely divided.

MORINDA. Linn.

Gen. Char. Flowers hermathrodite, rarely by abortion unisexual, confluent into a small head. Calyx-tube urceolate or hemispherical; the limb short truncate or obscurely toothed persistent, corol infundibuliform or hypocrateriform, the tube short glabrous or pilose in the jaws, the lobes 5 rarely 4, 6, 7-coriaceous valvate. Stamens as many as the corol lobes inserted into the jaws, filaments short, anthers fixed by the middle of the back linear or oblong obtuse at both ends, included or exserted; disk tumid or annular. Ovary 2-or imperfectly 4-celled (rarely completely 4 celled) Style included or exserted glabrous or pilose, with 2 short or elongate linear branches. Ovules twin when the cells are only 2 or imperfectly divided into 4, (solitary in the completely 4-celled ovaries) inserted near the base (or below the middle) of the cell, ascending anatropal or amphitropal, fruits of each flower-head united into a compound succulent berry (syncarpium), containing many hard 1-seeded pyrenes which are sometimes concrete into a 2-4 celled putamen. Seed ovoid or reniform, testa membranaceous, albumen fleshy, embryo terete, radicle inferior. Trees or shrubs, sometimes scandent glabrous or pubescent, leaves opposite or verticelled in threes. Stipules connate within the petioles in a short sheath, flower-heads on axillary or terminal solitary or clustered peduncles, flowers white. *Linn. Gen. n.* 235. Sphærophora, *Blume. Mus. Bot.* i. 179. *f.* 36.

1. Morinda citrifolia, *L.*—For description, &c., see Pl. ccxx.

The analysis which was drawn from living flowers, gives both 5-merous and 6-merous flowers, and shows the imperfectly 4-celled ovary. (I have never detected completely 4-celled ovaries.)

2. Morinda bracteata, *Roxb*—A small tree, glabrous, leaves opposite to each other or to a peduncle oblong or oval-oblong, acute smooth polished deep green on both sides, 6-12 inches long by 3-4½ inches broad, petioles 6-7 lines long; stipules broader than long rounded, peduncles solitary and always leaf-opposed round smooth 1-2 inches long supporting a single head of pure white flowers. Calyx a tumid ring, a small portion of the margin of which grows out into a long linear prominent leaflet, corol long funnel-shaped woolly in the mouth, filaments short, anthers linear included or exserted. Stigma 2-cleft exserted. Syncarpium size of a crab-apple. *Roxb. Fl. Ind.* i. *p.* 544;—*Wight Icones tab.* 126.

This species is very frequent about native gardens, temples, &c., in India and Ceylon, and it is wild in the north-east part of this Presidency, the root yields a dye.

3. Morinda exserta, *Roxb.*—A small tree, young shoots glabrous or villous, leaves opposite to each other or to a peduncle oval or oblong to ovate or lanceolate waved at the margins glabrous or downy, 4-5 inches long by 3-4 inches broad, petioles short, stipules broadly-oval obtuse entire emarginate or bifid, peduncles usually solitary sometimes 2 together leaf-opposed or in the axil of a small leaf, round smooth about 1 inch long each supporting a round head of many pure white flowers without floral leaves or bracteas, calyx annular, corol long infundibuliform, the limb 5-cleft, anthers much exserted, style the length of the tube. Syncarpium oval or roundish. *Roxb. Fl. Ind.* i. 545.

This tree is common in the Godavery forests, and the Circars, it is called in Teligu Togara mogali and Mogali, and 'Al in Hindustani; the root yields a red dye; the wood is hard and yellow and does not warp.

4. Morinda umbellata, *Linn.*—A large climbing shrub, glabrous or pubescent, leaves oblong-lanceolate to cuneate-oblong or obovate pointed glabrous or pubescent, usually with a small hairy gland in the axils of the veins on the under side, 1½-3 inches long, petioles about 3 lines long. Stipules membranaceous united into a truncated sheath, peduncles 3-8 together at the ends of the branches, about ½ as long as the leaves each with a small head of 6-12 flowers, the calyx tubes connate or immersed in the receptacle the margin entire, corol with a short straight tube scarcely as long as the 4-5-cleft limb, filaments short included inserted into the bottom of the dilated part of the tube amongst much hair, anthers exserted. Syncarpium 4-6 lines in diameter. *Linn. Sp. p.* 250. M. scandens, *Roxb. Fl. Ind.* i. 548.

Common in our western forests up to about 4000 feet elevation; the tough stems are used as ropes in Ceylon. A species from the Nilgiris (Sispara ghat) 5000 feet elevation, appears to differ in having sessile or subsessile peduncles but my specimens are not perfect enough for description.

I have a very distinct species from South Tinnevelly, but only in very young bud; the leaves and stems are covered with a very soft ash colored tomentum, the former are narrow linear lanceolate about 6 inches long by 1 broad and much scolloped in their lower half, inflorescence axillary, stipules much shorter than broad; it is a small tree and I found it on low hills between Singamputty and Seerumuthu ayen koil: it may be M. stenophylla, Spr.

PRISMATOMERIS. Thw.

Gen. Char. Flowers unisexual, calyx-tube in the male flower small turbinate, in the fertile obovoid, limb cupular truncate or 5-(in the fertile flower minutely 4-) toothed persistent, corol hypocrateriform, tube cylindric, jaws glabrous, limb with 4-5 lobes spreading triangular subimbricate (or valvate ?), stamens as many as the lobes inserted on the corol-tube, filaments short, anthers fixed by the back near the base, linear included, disk cushion-like, ovary 2 celled, style filiform, stigma fusiform 2 fid or the style branches 2 linear or lanceolate, ovules solitary in the cells fixed above the middle of the partition, berry globose or pea shaped ovoid fleshy 1-2 celled, 1-rarely 2-seeded, seed subglobose deeply excavated, umbilicus ventral, testa membranaceous, albumen fleshy or horny, embryo small axile, cotyledons reniform, radicle long obtuse inferior. Shrubs, branchlets compressed 4-angled, leaves subcoriaceous opposite

penniveined, stipules intrapetiolar broad 1-2-cuspidate, flowers white on slender pedicels axillary and sub-umbellately fascicled at the apices of the branches. *Thw. in Hook. Kew Journ.* viii. 268, *t.* vii-*A*.

1. PRISMATOMERIS ALBIDIFLORA, *Thw.*—A shrub, leaves elliptic with a short blunt acumination, 3-4 inches long by 1-1¼ broad, pedicels 1½ inches long solitary or twin in the axils or 3-4 subumbellately fascicled at the apices of the branches, corol very fleshy. *Thw. l. c.*;—*Bedd. Icones. Pl. Ind. Plate* xciii.

Ceylon, up to 4000 feet elevation.

Analysis, Pl. XXIX, fig. 4.

1, 2. Male flower buds, calyx slightly 5-toothed, corol-lobes fleshy subtriangular somewhat imbricate.
3. Corol opened out, stamens included, filaments quite adnate with the tube except at their apices but continued down to nearly its base though requiring to be peeled off to separate them from the tube.
4, 5. Anthers, front and black view.
6. Ovary, style and stigma from a fertile flower.
7. Ovary cut vertically, ovules solitary pendulous.
8. Ovary cut transversely, 2 cells.
9. A fruit. (All drawn from dried specimens.)
10, 11, 12. Views of the seed; from a drawing by Dr. Thwaites.

2. PRISMATOMERIS FERGUSONII, *Thw MS.*—A shrub very similar to the preceding but with the leaves rather larger, the pedicels shorter, all terminal and more numerous, and the corol much less fleshy.

Ceylon, near Columbo (the imbrication of the corol-lobes is easily seen in this species.)

Tribe XI, PSYCHOTRIEÆ.—*Corol lobes valvate. Stamens inserted into the jaws of the corol, ovary 2-(rarely 4-8-) celled, ovules solitary in the cells, basal, anatropal, often cuneate compressed, fruit with 2 pyrenes, which are convex on the back and flat sulcate or concave on the inner face, albumen generally horny, embryo often curved, cotyledons flat or semiterete, radicle straight or curved inferior. Trees or shrubs, rarely herbs.*

PSYCHOTRIA. LINN.

Gen. Char. Flowers hermathrodite rarely polygamo-diœcious, calyx-tube short, limb truncate toothed or lobed rarely persistent, corol funnel-shaped tubular or subcampanulate, the tube short or elongate straight, the jaws naked pilose or villous, the lobes 5 or rarely 4-6 valvate, stamens as many as the corol lobes inserted into the mouth or jaws of the corol, filaments short or subelongate, anthers fixed by the back near the base linear or oblong obtuse included or exserted; disk various, ovary 2-celled, style short or elongate glabrous or pilose with 2 short subulate linear or rarely spathulate branches. Ovules solitary in the cells erect from the base anatropal generally cuneate, berry or drupe small ovoid globose or pear-shaped sometimes didymous smooth or costate with 2 pyrenes or dividing into 2 cocci with a coriaceous endocarp. Seed hemispherical resembling the pyrene or endocarp in shape convex, on the back smooth costate or sulcate, the inner face flat or rarely concave often furrowed longitudinally, testa thin sometimes intruding within the furrow of the albumen, albumen fleshy or bony sometimes ruminate, embryo small, cotyledons flat ovate orbicular or lanceolate, radicle terete inferior. Shrubs or small trees, or climbing plants. *Linn. Gen. n.* 229. Grumilea, *Gœrtn.* Mapouria, *Benth. in Oerst. Cent. Am. Rub.* 10. Simira, *Aubl. Pl. Gui.* Mapouriopsis, *Griseb. Fl. Brit. W. Ind.* Patabea, *Aubl. l. c.* Ronabœa, *Aubl. l. c.* Strempelia, *A. Rich. in Mem. Soc. His. Nat.* Polyozus, *Bl. Bijdr.* Streblosa, *Korth. in. Ned. Kruidk. Arch.* Myrstiphyllum, *P. Br. Hist. Jam.* Psychotrophyum, *P. Br. l.c.*

This genus is abundantly represented by small shrubs in our moist western forests up to the highest elevations; there are some 8 or 10 species in this Presidency, and some 8 or 9 distinct ones in Ceylon: the species are difficult to distinguish, and have not as yet been thoroughly worked out; I have given Analysis from P. elongata, one of our commonest species

Analysis, Pl. XVII, fig. 6.

PSYCHOTRIA ELONGATA.

1. Portion of the inflorescence.
2. A flower bud, corol-lobes valvate.
3. A 5-merous flower.
4. A 4-merous flower.
5. A 5-merous flower opened.
6. A tube of the corol.
7. Anthers, front and back view.
8. A flower, corol removed and calyx opened to shew disk, style and the 2 lobed stigma.
9. Ovary cut vertically to shew the erect ovules.
10. Ovary cut transversely.
11. Portion of a fruit branch.
12. A fruit.
13. The same cut vertically, seeds with ruminated albumen.
14. The same cut transversely.
15. The embryo. (All drawn from living specimens.)

LASIANTHUS. JACK.

Gen. Char. Calyx-tube subglobose ovoid or oblong, limb short or elongate 3-6-toothed or lobate persistent. Corol infundibuliform or hypocrateriform, the tube short or subelongate, the jaws villous, the lobes 4-6 spreading, valvate in the bud, stamens 4-6 inserted into the jaws of the corol, filaments short, anthers fixed by the back near the base included or shortly exserted linear or ovato-

oblong, connective often apiculate, disk tumid, ovary 4 9-celled, style short or subelongate glabrous or pilose, the stigmas equalling the number of ovary cells short obtuse, ovules solitary in the cells linear erect from the base anatropal, drupe with 4-9 pyrenes, pyrenes cartilaginous or crustaceous 1 seeded. Seed linear-oblong slightly curved, testa membranaceous, albumen fleshy, embryo terete elongate, cotyledons short obtuse, radicle elongate inferior. Shrubs, often fetid, glabrous tomentose or strigose, branchlets terete, compressed at the ends, leaves distichous opposite shortly petiolate generally caudato-acuminate, the transverse venules prominent. Stipules inter-petiolar broad persistent or deciduous, flowers white small capitate or fascicled or rarely at the apex of a peduncle in the axils of the leaves, fruit small. *Jack. in Trans. Linn. Soc. XIV.* Mephitidea, *Reinw. et Bl. Bijdr.* Santia, *WA. Prod.* 422.

This genus is most abundantly represented by small shrubs in all our moist western forests up to the highest elevations; about 20 species are described from this Presidency and Ceylon, several of which I have figured in my *Icones*; there is a close resemblance between them all, the genus is readily known by its numerous stigmas.

I have given analysis from one of the commonest species (L. venulosus, abundant in woods about Ootacamund.)

Analysis, Pl. XVII, fig. 5.

LASIANTHUS VENULOSUS.

1. A flower bud.
2. A full flower.
3. A 5-merous corol removed and opened.
4. A 4-merous corol.
5. Anthers, front and back view.
6. Calyx, style and 4-lobed stigma.
7. Ovary cut vertically, shewing the erect ovules.
8. Ovary cut transversely, shewing its 4 cells.

SAPROSMA. BLUME.

Gen. Char. Calyx-tube obconical, limb dilated or subcampanulate 4-lobed or unequally 4-6 toothed or lobate persistent; corol campanulate or infundibuliform villous in the jaws, the lobes 4 short obtuse induplicate-valvate, the margins flat or crispate. Stamens 4 inserted into the corol jaws, filaments short or none, anthers fixed at the back near the base linear half exserted, disk hemispherical. Ovary 2-celled, style filiform the branches or stigmas 2 included, ovules solitary in the cells erect from the base anatropal, fruit obovoid oblong ellipsoid or globose, with 2 pyrenes, pyrenes crustaceous, endocarp cartilaginous or crustaceous, seed erect plano-convex, the ventral face not furrowed subovoid, testa membranaceous, albumen fleshy, embryo axile equalling half the seed, cotyledons broad ovate or cordate foliaceous, radicle elongate terete inferior. Shrubs or small trees, generally glabrous very fetid when crushed, leaves opposite or ternately verticelled, flowers white small sessile and congested or on axillary or terminal peduncles, drupe small purple. *Blume Bijdr.* 956. Dysosmia, *Miq. Fl. Ind. Bat.* ii. 325. Dysodidendron, *Gard. in Calc. Journ. Nat. Hist. VII.* 56. Serissa, *Thw.* not *Commers.*

1. SAPROSMA WIGHTII, *Gardn.*—A shrub or small tree 8-12 feet or more, branches terete dichotomous, leaves glabrous penni-veined lanceolate acuminate attenuated at the base, 3-3½ inches long 10-15 lines broad, petioles ½ an inch, stipules connate toothed, peduncles 1 flowered, axillary or terminal 4 lines long bi-bracteolate a little above the base and at the apex, calyx tube obovate adherent glabrous ebracteolate at the base, limb 4-toothed, teeth broad acute, corol purplish infundibuliform very minutely papillose on the outside, about 6 lines long deeply 4 cleft, stamens included or very slightly exserted, fruit obovate to oblong deep blue very fetid. Lasianthus ? fœtens, *Wight.* Dysodidendron Wightii, *Gardn.* Serissa Wightii, *Bedd. Icones. Pl. Ind. Or. tab.* xv.

In moist woods on the Nilgiris 6000 feet, Anamallays, Coimbatore hills, Tinnevelly ghats 3000 4000 feet.

Analysis, Pl. XVII, fig. 4.

(Under the name of Serissa, which should be altered to Saprosma.)

1. A bud, corol lobes induplicato-valvate.
2. A full flower, showing the margins of the lobes of the corol folded over.
3. Corol removed and opened to show the stamens.
4. Anthers, front and back view.
5. Ovary cut vertically, shewing the erect ovules.
6. Calyx, style and stigma.
7. A lobe of the corol, back view, the thin margins opened out.
8. Fruit.
9. The fruit cut vertically.

2. SAPROSMA FRAGRANS, *Bedd.*—A shrub or small tree 10-12 feet or more, branches dichotomous, leaves glabrous, penniveined oblong to oblongo-lanceolate acuminate attenuated at the base, 3-4 inches long by 1½ 2 inches broad, petioles 3 lines long, stipules entire or toothed, peduncles terminal very short bracteolate, pedicels 1-5 ebracteolate about 2 lines long, calyx cup-shaped subentire or slightly 4-lobed ebracteolate at the base, corol infundibuliform, tube very long minutely papillose on the outside slightly villous within, stigma 2-lobed, lobes elongate, fruit oblong. *Bedd. Icones. Pl. Ind. Or. tab.* xiv.

Western slopes of the Nilgiris, 3-4000 feet elevation. A very handsome shrub, flowers very sweet scented, but fetid when crushed.

3. SAPROSMA GLOMERATA, *Gardn*—A small shrub, branches terete dichotomous, leaves glabrous ovate or elliptic acuminate subsessile, 1½-4½ inches long ½-2 inches broad, penniveined. Stipules connate entire or toothed, flowers few terminal subsessile, calyx with 4-5 acute lobes, corol white infundibuliform 2-3 lines long, anthers included 4-5, stigma with 2 flattened lobes, fruit globose deep

blue very fetid as is the whole plant when crushed. Dysodidendron glomeratum, *Gardn.* Saprosma Indica, *Dalz.* Serissa Gardneri, *Thw.* Serissa glomerata, *Bedd. Icones. Pl. Ind. Or. tab.* xvi.

Very common in the moist forests of all the western part of the peninsula 2000-4000 feet, and in Ceylon.

4. Saprosma corymbosa, *Bedd.*—A shrub 4-6 feet, branches 4 angled, leaves glabrous elliptic acuminate 3 6 inches long by 1-2½ inches broad, penniveined, petioles ¼-½ inch long. Stipules connate toothed, panicles terminal and axillary 2-3 inches long dichotomously branched bracteolate at the ramifications, calyx bracteolate at the base 4-lobed or subentire. corol-tube 3 lines long papillose on the outside, hairy within, obsoletely induplicate, anthers on longish filaments considerably exserted. Stigma with 2 flattened lobes. Serissa corymbosa, *Bedd. Icones. Pl. Ind. Or. tab.* xvii.

Tinnevelly hills, south of Courtallum, 3000-4000 feet; like the other species, very fetid.

5. Saprosma Ceylanica, *Gard.*—A shrub 8-12 feet glabrous, branches dichotomous a little compressed, leaves membranaceous oblong or oblongo-lanceolate acuminate more or less acute at the base shortly petiolate, 2½-6 inches long by ¾-2½ inches broad, petioles 1-3 lines long. Stipules short more or less connate 3-cuspidate deciduous; peduncles axillary and terminal 1-3 flowered much shorter than the leaves, pedicels 2-bracteolate at the apex and base, bracteoles connate, flowers 4-merous. Calyx sinuately 4-toothed; corol infundibuliform minutely pubescent outside, villous in the jaws, the limb 5-7 lines in expansion, fruit bluish-purple ovoid or oblong 4-9 lines long 1-celled 1-2-seeded. Dysodidendron Ceylanicum, *Gard. Calc. Journ. of Nat. Hist. vol. VII.* Serissa, *Thw. En. Pl. Zey. p.* 150.

Ceylon, central provinces.

6. Saprosma scabrida, *Thw.*—A shrub, branches scabrous, leaves elliptic acuminate acute at the base glabrous, 2-3 inches long by ¾-1¼ broad, costa and petiole (3 lines) scabrous. Stipules connate aristato-fimbriate scabrous, flowers terminal sessile, calyx pilose, teeth 4 linear-lanceolate. Serissa scabrida, *Thw. En. Pl. Zey. p.* 151.

Ceylon, near Ratnapoora.

Tribe XII, Pæderiæ.—*Flowers hermathrodite or polygamo-diœcious, corol lobes valvate, stamens inserted in the jaws or on the tube (sometimes near the base) of the corol. Ovary 2-5 celled, style branches or stigmas 2 or 5 filiform papillose, rarely short and obtuse, ovules solitary in the cells erect from the base anatropal. Fruit globose compressed or angled, either a 5-angled capsule or dicoccous, the epicarp thin and fragile, the pyrenes free or pendulous from a central column; albumen fleshy scanty or copious, cotyledons broad foliaceous, radicle inferior. Erect or scandent shrubs, fetid when bruised, stipules entire.*

HAMILTONIA. Roxb.

Gen. Char. Calyx-tube ovoid, limb 5-parted, the segments subulate persistent, corol infundibuliform, the tube long and straight, the lobes 5-4 short oblong valvate, stamens 5 inserted into the jaws of the corol, filaments short subulate, anthers fixed by the back below the middle included obovato-oblong, disk cushion-like. Ovary 5-sulcated the exocarp free from the 5-celled endocarp, the partitions soon disappearing so that it appears as if 1-celled, style filiform 5-cleft at the apex, the branches linear truncate or obtuse, ovules solitary in the cells erect from the base anatropal. Capsule dehiscing at the apex into 5 valves, 5-seeded, seed oblong triquetrous covered with a dry reticulated net like membrane, embryo erect, cotyledons foliaceous cordate, radicle terete inferior. Shrubs hispid or glabrous, leaves opposite petioled fetid when bruised ovato-lanceolate, stipules short acute broad at the base persistent, flowers sweet scented blue or white in terminal trichotomous panicles, fruit small. *Roxb. Fl. Ind.* i. 554. Spermadictyon, *Roxb. Cor. Pl.* iii. 32, *t.* 236.

1. Hamiltonia suaveolens, *Roxb.*—A large shrub or small tree, leaves lanceolate or ovato-lanceolate acute quite glabrous or more or less hirsute on both sides, penniveined, 5-8 inches long by 1½-3 inches broad, petioles 3-9 lines long. Stipules triangular from a broad base pointed, flowers pale blue or white very fragrant (fetid if crushed, as are all the parts) in terminal panicles, congested or subumbellate at the apices of the branchlets, bracts and bracteoles subulato-lanceolate. Calyx 5-cleft, segments subulate, corol lobes 5-4. Stamens always 5, the rest as in the generic character, fruit size of a pea. *Roxb. Fl. Ind. ed. Wall.* ii. 223. H. Mysorenis, *WA. Prod.* 423.

I have specimens of this beautiful shrub from the Goomsoor forests (1000 feet elevation), the Myhendra hill near Berhampore (4300 feet), Jubbulpore, the Nallay Mallays (Kurnool district) and Mysore; the plant from the Kurnool hills has the panicles more lax and the flower nearly glabrous, but does not otherwise differ.

Analysis, Pl. XVII, fig. 3.

1. A flower bud, the corol-lobes valvate.
2. A flower with only 4 corol-lobes.
3. A calyx.
4. A 5-lobed corol removed and opened to show the 5 stamens.
5. Anther, back view.
6. Anther, front view.
7. Portion of a 4-lobed corol opened to shew that it has 5 stamens.
8. Ovary cut vertically, shewing the erect ovules, (the transverse section shows 5 cells when very young, but the partitions soon disappear and the advanced ovary and the fruit are 1-celled), the style and 5-lobed stigma.
9. Style and stigma (in the plate it appears only 4 but should be 5-lobed.)

Tribe XIII, Octotropideæ.—*Corol-lobes contorted, ovary 1-celled, ovules solitary or twin pendulous.*

OCTOTROPIS. Bedd.

Gen Char. Calyx-tube short turbinate obconical, limb erect shortly 5-toothed persistent, corol campanulate hairy in the jaws, lobes 5 ovate about ½ as long as the tube patent, contorted in the bud, stamens as many as corol-lobes and inserted between them in the

Octotropis Travancorica (Bedd.)

See Manual under Rubiaceæ

jaws, anthers exserted, sessile long-linear deeply sagittate at the base, apiculate at the apex, fixed by the back near the base, disk tumid, ovary 1-celled, style stout exserted 8-keeled or almost winged, the keels ciliate, stigma shortly bifid glabrous, the lobes ovate acute, ovules 1-2 pendulous from the apex of the cell, fruit (immature) oblong coriaceous about 6 lines long crowned by the remains of the calyx, indehiscent ? A glabrous shrub, branches terete, leaves opposite from ovate or oblong to elliptic with a long fine acumination, the primary veins 6-7 on each side much looped towards the margin, veinlets reticulated. Stipules interpetiolar triangulari-ovate with a longish acumination persistent, flowers in axillary or supra-axillary loose puberulous corymbose panicles which are about ⅓ or ½ as long as the leaves, bracts and bracteoles minute subulate.

1. Octotropis Travancorica, *Bedd*.—A large shrub, leaves glabrous 5-6 inches long by 1¼-3 inches broad, petioles 2-3 lines long, flowers white 6-7 lines in expansion, the tube about 3 lines long.

Travancore hills, 3000 feet. Chokampatty hills (Tinnevelly) 3500 feet.—See Pl. cccxxvii.

Analysis.

1. A flower bud, corol-lobes contorted.
2. A full flower, anthers exserted.
3. The 5-lobed corol opened out, hairy in the jaws, stamens 5 sessile.
4. Anthers, front and back view, sagittate at the base, furnished with a long apiculation at the apex.
5. A vertical section of a flower from which the corol has been removed, shewing the single celled ovary with 1 pendulous ovule, the disk, style and stigma.
6. Vertical section of an ovary shewing 2 pendulous ovules.
7. The style much magnified, shewing the 8 ciliate sulcations or wings.
8. Nearly ripe fruit (life size.)
9. A fruit magnified.

ADDENDA ET CORRIGENDA.

Manual page viii. For Sageræa, *Dalz.*, read Bocagæa, *St. Hilaire.* (Sageræa is a synonym.)

For Sageræa Dalzellii and S. laurina, read Bocagæa Dalzellii (they are both the same species.)

For S. Thwaitesii, read Bocagæa Thwaitesii.

For Popowia ramosissima, read Popowia Leddomeana *(H. f. et T.)*

" x. Under Polyalthia enter

12. POLYALTHIA RUFESCENS, *H. f. et T.*—A tree, young branches densely tomentose, leaves subsessile narrow oblong acute or acuminate, base obliquely cordate glabrous except on the midrib beneath, 3-7 inches long by 1-1¾ inch broad shining above pale below, peduncles ½-1 inch long stout tomentose solitary often leaf-opposed jointed, and minutely bracteate at the base, flowers ½-⅔ inch in diameter brown tomentose. Sepals small broadly ovate acute, petals oblong subacute thick, outer twice? as big as the inner, ovaries densely silky. *Flora of Brit. Ind. p.* 66.

Cochin (Wight). I have never seen this tree.

" xi. Orophea coriacea, *Thw.*, and O. obliqua, *Thw.*, are both species of Bocagæa.

" xv. Hooker says that Scolopia Wightiana is an Aporosa (Euphorbiaceæ). I have not seen it.

" xvi. Before Aberia enter

XYLOSMA. FORSTER.

Gen. Char. Same as Flacourtia, but ovary with 2 rarely 3-6 few-ovuled parietal placentas, and usually entire very short style, capitate stigma and globose 2-8 seeded berry.

1. XYLOSMA LATIFOLIUM, *H. f. et T.*—A large thorny tree, young shoots finely downy, leaves broadly elliptic-oblong obtuse or acute obtusely serrate or subentire, 2-5 inches long by 1-2½ inches broad, hardly coriaceous, veins 4-5 on each side very oblique the 2 lower running nearly through the blade, petioles ⅛-½ inch long pubescent. Male flowers in small branched slender pubescent few flowered ½ to 1 inch long panicles, bracts linear oblong. Sepals minute orbicular ciliate, fruit about ⅙ inch in diameter with 4 placentas. Style very distinct. Stigma capitate 4-lobed.

Bababooden Hills, Mysore.

" xvii. Under Pittosporum enter

4. PITTOSPORUM DASYCAULON, *Miquel.*—A small tree or shrub, branches densely tomentose, leaves lanceolate or oblong-lanceolate glabrous, or the midrib beneath downy, 2½ 4 inches long by 1-1½ inches broad pale green when dry thin coriaceous, margin-subundulate, young petioles tomentose, flowers white in dense much branched terminal compound tomentose corymbs. Sepals ciliate, ovate acute, anthers bright yellow. Capsule large compressed densely tomentose before dehiscence, about 6-seeded; flowers much larger than in floribundum. *Flora of British Ind. p.* 199.

Canara, Concan, Belgaum.

5. PITTOSPORUM CEYLANICUM, *Wight.*—A small tree, branches leafy glabrous, leaves narrow-obovate obtuse or subacute, base tapering, 3-4 inches long by ¾-1¼ inches broad, turning black in drying; petiole ¼-½ inch long, flowers ½ inch long greenish-white in terminal peduncled or compound corymbs, peduncles several 2-3 inches long glabrous, bracteoles small ovate at the base of the pedicels, sepals ovate acute subciliate, ovary pubescent, style glabrous, capsule globose, compressed 2-valved. *Wight. Ill.* 173;—*Flora British Ind.* 199.

Ceylon, 3-5000 feet elevation. (Distinct from No. 1, under which I had placed it as a synonym.)

" xxvii. After Monoporandra enter

BALANOCARPUS. BEDD.

Gen. Char. Tube of the flowering calyx very short adnate to the torus, segments imbricate in 2 series, in fruit erect and enlarging and forming a hard woody 5-lobed cup but not expanding into wings, petals entire or erose at the apex. Stamens 15 alternately single and double (as in Hopea) attached to the base of the petals, anthers oblong terminating in a very long bristle or awn, filaments broad at the base apiculate below the

anther ; ovary 3-celled, cells 2-ovuled, ovules collateral attached to nearly the centre of the partition, style short terete, stigma minute entire. Nut oblong or subglobose with a hard sharp point at the apex, hard and almost woody, seed erect, cotyledons very thick fleshy unequal, the larger irregularly 2-3-lobed, radicle prominent exposed in a linear cavity. Large trees, yielding hard durable timber, stipules inconspicuous and early deciduous, leaves entire coriaceous penniveined and reticulately venose, flowers as in Hopea.

1. BALANOCARPUS EROSA, *Bedd.*—A large tree, glabrous, leaves oblong obtuse and emarginate or scarcely acute at the apex, rounded or subcordate (often unequally) at the base, glabrous, shining above, 4-7 inches long by 1¼-2¼ broad, petioles 2-3 lines long much thickened, panicles glabrous or very minutely puberulous few flowered several together in the axils shorter than the leaves, bracts and bracteoles small somewhat persistent, flowers about 3 lines long, calyx slightly puberulous on the outside, petals erosely bifid at the apex silky with long white hairs on the outside glabrous within, nut oblong pointed 16-17 lines in length 9 lines in breadth, fruiting calyx segments truncated, smooth or subtuberculate.

Tinnevelly mountains, 2000-3000 feet elevation.

Plate cccxxix.

Analysis.

1. A flower bud.
2. Full flower, calyx slightly puberulous, petals with long hairs.
3. Calyx.
4. Corol opened out, petals erose at the apex, stamens 15 in 10 rows alternately single and double (as in Hopea.)
5, 6. Stamens.
7. Ovary cut vertically, ovules attached to centre of axis.
8. Ovary cut transversely 3 cells each 2-ovuled.
9. Branch in fruit.
10. A ripe fruit, a hard woody nut, seated in the enlarged woody calyx.
11. The calyx.
12. The seed removed, the radicle exposed on the outside of the cotyledons.
13. The radicle removed, side view.
14. The seed seen from the side opposite to the radicle, the larger cotyledon split into 3 lobes.
15. A seed just after germination has commenced, showing the fleshy cotyledons and the radicle

2. BALANOCARPUS UTILIS, *Bedd.*—A lofty tree, young branches hoary, leaves lanceolate attenuate at the base obtuse or subacute at the apex glabrous 5-6 inches long by 1¼-1½ inch broad, petioles 6-8 lines long, panicles hoary with a minute soft silky pubescence solitary or several together in the axils shorter than the leaves, bracts and bracteoles minute very early caducous, flowers secund about 2 lines long, calyx and corol hoary on the outside, petals oblong obtuse crenated towards the apex, nut subglobose pointed about ½ an inch each way shining and generally covered with a gummy resin ; fruiting calyx segments subacute very tuberculate below.

Tinnevelly hills, south of Courtallum, 1000-3000 feet elevation, called Kara kong ; yields a very valuable timber very similar to that of Hopea parviflora. When in flower only it is scarcely distinguishable from the long leaved variety of Hopea parviflora which grows in the same localities.

Plate cccxxx.

Analysis.

1, 2. Flower buds, calyx and corol hoary with very short silky pubescence.
3. Calyx.
4. Corol opened out, stamens 15 in 10 rows alternately single and double (as in Hopea.)
5. One of the oblong obtuse petals crenate towards the apex.
6, 7. Stamens, filaments broad and flat at the base apiculate at the apex, anthers oblong with a long terminal hair-like bristle.
8. Ovary cut vertically, ovules attached to centre of axis.
9. Ovary cut transversely, 3 cells each 2-ovuled.
10. Branch in fruit.
11, 12. The fruit, a subglobose hard woody nut, seated in the enlarged hard woody tuberculate calyx.
13. A nut broken open, showing the seed, the radicle exposed outside the cotyledons.

Manual page lv. Under Aglaia add

2. AGLAIA MINUTIFLORA, *Wight.*—A good sized tree densely covered with stellate down, leaves unequally or rarely equally pinnate up to more than 2 feet long by 1 foot broad, leaflets 4-6 pair, in age glabrous above except the costa, densely stellato-downy underneath, oblong to lanceolate with a long fine acumination, slightly and irregularly toothed or subentire, 3-6 inches long by 1-2 broad, primary veins prominent 10-14 on each side, male panicles axillary very large and very compound, from much shorter to about as long as the leaves, flowers very numerous very minute ½ a line in diameter, stamens 5 exserted beyond the nearly entire staminal tube, calyx hairy, petals glabrous, fruit densely stellate downy about 1 inch in diameter. Aglaia polyantha, *Bedd. in distrib.* Aglaia minutiflora, *Wight. Bedd. Icones tab.* cxciii.

Travancore hills, 2-3500 feet elevation, Assambu hills, South Travancore, and Peermede, North Travancore.

Balanocarpus erosa (Bedd.)

See Addenda to Manual

Balanocarpus utilis (Bedd.)

See Addenda to Manual

Manual page lxvii. TROCHISANDRA, *Bedd.*—This genus is not distinct from Kurrimia.

lxxii. Omit Anomosanthes, it being Hemigyrosa deficiens, figured in Plate ccxxxi.

xcvii. Under Parinarium add

2. PARINARIUM TRAVANCORICUM, *Bedd*—A small very graceful tree, young parts with silky adpressed greyish white pubescence, leaves membranaceous or submembranaceous lanceolate or linear lanceolate with a generally bluntish acumen entire glabrous in age except the costa beneath which is often silky, 4-5 inches long by 1-1¼ broad, furnished with 2 inconspicuous glands at the base of the lamina beneath, primary veins numerous, veinlets much reticulated and prominent beneath, petioles 2-3 lines long. Stipules 4-5 lines long linear-lanceolate silky deciduous, racemes terminal simple or cymosely branched 3-4 inches long silky pubescent furnished with numerous lanceolate or linear-lanceolate bracts. calyx-segments ribbed down the back acuminate or acute, petals oval or oblong glabrous veined. Stamens 12-10 unilateral quite free at the base, filaments twice as long as the calyx-tube, ovary hirsute 2-locellate. *Bedd. Icones tab.* clxxxix.

I have only found this very graceful tree on the Travancore mountains about 2000 feet elevation, near the Rosemallay Coffee Estates not far from Courtallum; it is allied to P. Indicum, but more pubescent and with much smaller narrower leaves.

" cxxiv. Omit Dichilanthe as it is now placed under Rubiaceæ (vide that order.)

" cxxxv. The genus Monosis is now included under Vernonia.

" cxliii. For Diospyros exculpta, *Ham*, read D. Tupru, *Buch.*

For Diospyros Wightiana, *DC.*, read D. melanoxylon, *Roxb.*

For Diospyros calycina, *Bedd*, read D. foliolosa, *Wall.* (add the first names as synonyms.)

" cxliv. Omit D. nigricans as it appears to be only a form of D ebenum.

" cxlv. For D. microphylla, *Bedd*, read D. buxifolia, *Bl.* (the former name becomes a synonym.)

" cxlvi. Omit Diospyros obovata, *Wight*, as it is only a form of Bassia Wightiana.

" cxlvii. Omit the genus Macreightea; it is now incorporated in Maba: the 3 species become

Maba oblongifolia.
" ovalifolia.
" acuminata.

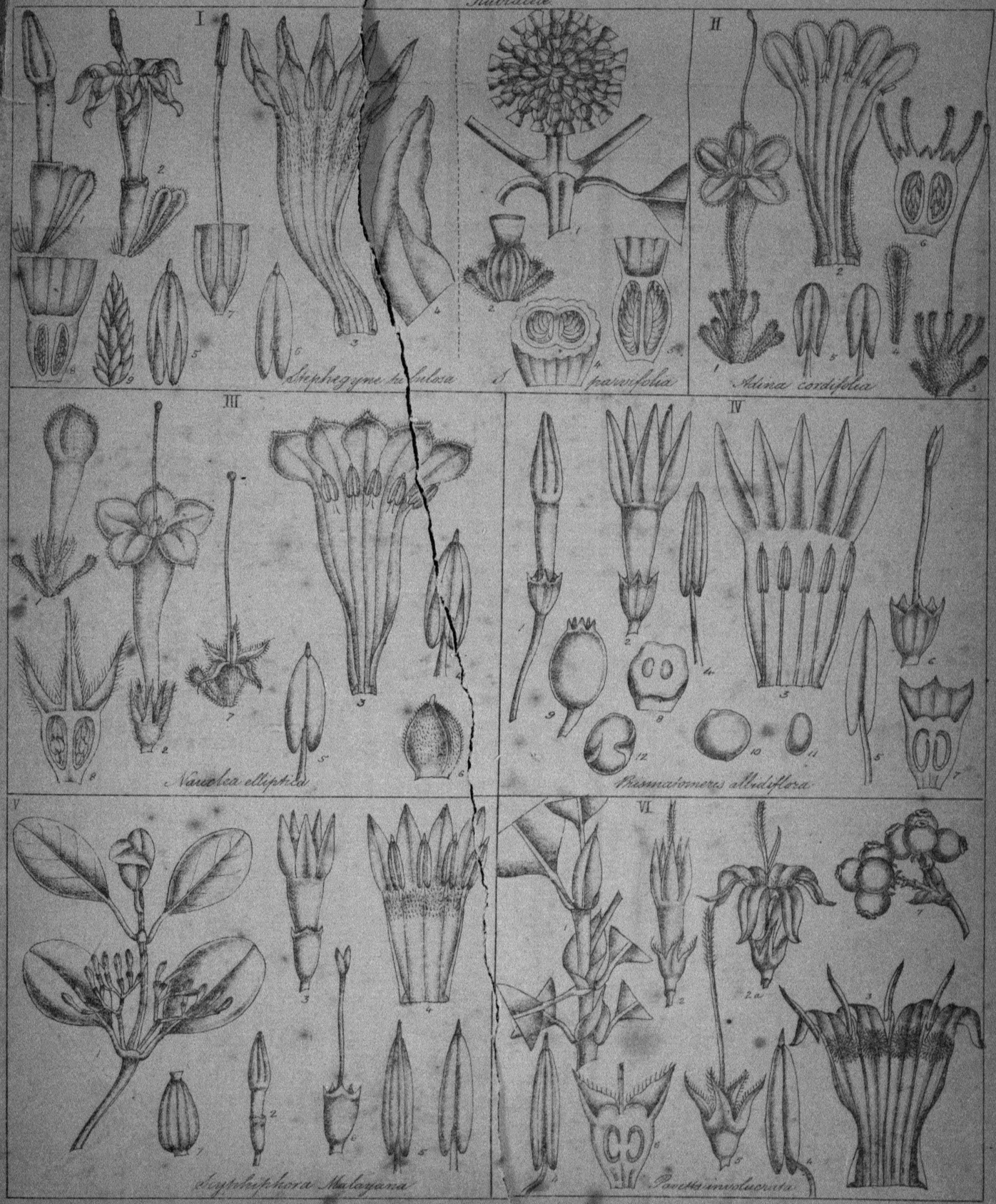
Omit the genus Holochilus as it is now incorporated in Maba: the species becomes Maba micrantha.

" ccxiii. For Blackia read Blachia.

N. B.—A few errors in the nomenclature of the Plates have been altered in both the Alphabetical Index to the Plates and in the Index arranged according to Natural Orders.

ANALYSIS OF GENERA

Rubiaceæ



INDEX

TO THE TREES AND SHRUBS FIGURED, ARRANGED ACCORDING TO THEIR NATURAL ORDERS.

(The Italics are Synonyms.)

ORDER I—DILLENIACEÆ

				Tab.
1.	Dillenia speciosa.	...	...	... ciii.
	,, *bracteata*	...	...	... cxv.
	,, pentagyna	...	...	.. civ.
3.	Wormia bracteata	...	...	... cxv.

II.—MAGNOLIACEÆ.

4.	Michelia Nilagirica.	...	...	... lxii.

III.—ANONACEÆ

5	Bocagea Dalzellii, Anal Pl. I. fig 4.			
	Sageræa Dalzelii, Anal Pl. I. fig 4.			
6	Popowia Beddomeana, Anal. Pl. I fig. 2.			
	Popowia ramosissima, Anal. Pl. I. fig 2.			
7	Goniothalamus Wightii, Anal. Pl I fig. 3.			
8.	Mitrephora grandiflora	...	..	... lxxv
9.	Xylopia parviflora.	...	...	... clxxii.
10.	,, Championii, Anal. Pl. I. fig. 5.			
11	Cyathocalyx Zeylanicus, Anal. Pl. I. fig. 6.			
12.	Unona Lawii, Anal Pl I. fig. 1.			
13	Polyalthia cerasoides.	..	...	. i.
14.	,, longifolia.		...	... xxxviii.
15.	,, coffeoides.	.	...	. lxxiii.
16.	,, fragrans.	...	..	... lxxiv.
	Guatteria. See Polyalthia			
17.	Phæanthus Malabaricus, Anal. Pl. I. fig 7.			
18	Saccopetalum tomentosum	...	...	. xxxix.
19	Miliusa velutina	...	...	.. xxxvii.
20.	Alphonsea Madrasapatana	...	...	. lxxvi.
21.	Orophea erythrocarpa, Anal. Pl. I fig. 8			

IV.—MENISPERMACEÆ.

22	Cocculus cordifolius, Anal. Pl. II fig. 1.			

V.—BERBERIDACEÆ

23.	Berberis Nepalensis, Anal Pl II. fig. 2.			
	Berberis Leschenaultii, Anal. Pl II. fig 2.			
	Mahonia. See Berberis.			

VI.—CAPPARIDACEÆ

24.	Capparis stylosa, Anal. Pl. II. fig. 3			
25.	Cratæva religiosa.	...	...	... cxvi.

VII.—MORINGACEÆ.

26.	Moringa pterygosperma.	..	...	... lxxx.

VII-A.—VIOLACEÆ.

				Tab.
27.	Alsodeia Zeylanica.	...	..	... ccxxix.

VIII.—BIXINEÆ.

28.	Cochlospermum gossypium.	..	...	... clxxi.
29.	Bixa Orellana.	...	...	.. lxxix.
30.	Scolopia crenata.		..	... lxxviii.
	Phoberos. See Scolopia.			
31.	Erythrospermum phytolaccoides, Anal. Pl. II. fig. 6.			
32.	Flacourtia inermis, Anal. Pl. II. fig. 4.			
33.	,, sapida, Anal. Pl. II. fig. 4.			
34.	,, sepiaria, Anal. Pl. XXIV. fig. 4. ♀ only			
35.	Aberia Gardneri, Anal. Pl. II. fig. 5.			
	Roumea hebecarpa, Anal. Pl. II. fig. 5.			
36.	Trichadenia Zeylanica, Anal. Pl. II. fig. 7.			
37.	Hydnocarpus alpina.	...	..	.. xxvii.
37*a*.	Asteriastigma macrocarpa.	...	...	... cclxvi.

IX —PITTOSPOREÆ.

38. Pittosporum tetraspermum, Anal. Pl. II. fig. 8.

X.—POLYGALEÆ.

39. Xanthophyllum angustifolium, Anal. Pl. III. fig. 2.
40. ,, virens, Anal. Pl. III. fig. 2.
41. ,, Arnottianum, Anal. Pl. III. fig. 2.

XI.—TAMARISCINEÆ.

42. Tamarix ericoides, Anal. Pl. III. fig. 1.
Trichaurus. See Tamarix.

XII.—GUTTIFERÆ.

43.	Garcinia Cambogia	...	..	... lxxxv.
44.	,, Morella.	...	...	... lxxxvi.
45.	,, pictoria.	..	..	.. lxxxvii.
46.	,, Travancorica.	...	...	... clxxiii.
	Garcinia papilla	..	...	... lxxxv.
47.	Xanthochymus pictorius.	...	...	... lxxxviii.
	Stalagmites. See Xanthochymus.			
48.	Ochrocarpus longifolius.	...	..	... lxxxix
	Calysaccion longifolium.	..	...	... lxxxix.
	Mammœa. See Ochrocarpus.			
49.	Calophyllum elatum	..	..	... ii.
50.	,, Wightianum.	..	...	... xc.
	Calophyllum decipiens.	...	...	... xc.
	Calophyllum spurium.	..	..	... xc.
51.	Kayea stylosa.	...	...	... cii.
52.	Mesua Coromandelina.	..	...	.. lxiv.
	Hebradendron Cambogioides,	..	...	.. lxxxvi.

XIII.—TERNSTRÆMIACEÆ.

53.	Ternstræmia gymnanthera	...	...	... xci.
	Cleyera gymnanthera	..	...	.. xci.
54.	Adinandra lasiopetala, Anal. Pl. III. fig. 3,			
	Cleyera lasiopetala, Anal. Pl. III. fig. 3.			
	Sarosanthera lasiopetala, Anal. Pl. III. fig. 3.			
55.	Eurya Japonica.	..	...	... xcii.
	Eurya Wightiana	...	...	... xcii.
56.	Gordonia obtusa.	...	..	... lxxxiii.
	Gordonia parvifolia.	..	...	.. lxxxiii.
57.	Pæciloneuron Indicum	...	...	.. iii.
58.	,, pauciflorum	...	...	... xciii.

XIV.—DIPTEROCARPEÆ.

59.	Dipterocarpus Indicus	...	...	... xciv.
60.	Vatica Roxburghiana	...	...	... xcv.

				Tab.
	Vatica Tambagaia	...	...	.. v.
	Vatica laccifera	..	..	.. vi.
61.	Shorea robusta.	..	...	... iv.
62.	,, Tambagaia	...	...	... v.
63.	,, laccifera	..	...	... vi.
64.	Hopea parviflora	...	...	... vii.
65.	,, Wightiana	...	..	.. xcvi.
66.	Doona Zeylanica	...	...	... xcvii.
67.	,, Gardneri	...	..	.. xcviii.
68.	Vateria Malabarica	..	...	... lxxxiv.
69.	Vateria Indica	...	...	... lxxxiv.
70.	Stemonoporus Gardneri	...	...	.. xcix.
71.	,, acuminatus	..	...	.. c.
72.	Monoporandra cordifolia	...	...	... ci.
72*a*.	Balanocarpus utilis.	..	..	.. cccxxx.
72*b*.	,, erosa	...	..	.. cccxxix.

XV.—MALVACEÆ.

73.	Kydia calycina, Anal. Pl. III. fig. 5.			
	Kydia fraterna, Anal. Pl. III. fig. 5.			
	Kydia axillaris, Anal. Pl. III. fig. 6.			
74.	Julostyles angustifolia, Anal. Pl. III. fig. 4.			
75	Dicellostyles axillaris, Anal. Pl. III. fig. 6.			
76.	Hibiscus tiliaceous, Anal. Pl. IV. fig. 1.			
77.	Thespesia populnea	...	...	... lxiii.
78.	Bombax Malabaricum	...	..	... lxxxii.
	Salmalia Malabarica	...	...	.. lxxxii.
	Bombax heptaphylla.	...	...	.. lxxxii.
79.	Eriodendron anfractuosum, Anal. Pl. IV. fig. 2.			
80.	Cullenia excelsa, Anal. Pl. IV. fig. 3.			

XVI.—STERCULIACEÆ.

81.	Sterculia guttata ...	...	...	... cv.
82.	,, Haynii	...	...	... cccxxx.
83.	Heritiera littoralis, Anal. Pl. XI. fig. 6.			
84.	,, Papilio	...	...	... ccxviii.
85.	Kleinhovia hospita, Anal. Pl. IV. fig. 4.			
86.	Helictores Isora, Anal. Pl. V. fig. 1.			
87.	Pterospermum rubiginosum	...	...	... cvi.
88.	Eriolœna Hookeriana, Anal. Pl. V. fig 2.			
89.	,, quinquelocularis, Anal. Pl. V. fig. 2.			
	Microclœna quinquelocularis, Anal. Pl. V. fig. 2.			
90.	Melochia velutina, Anal. Pl. V. fig. 3.			
	Visenia umbellata, Anal. Pl. V. fig. 3.			
91.	Abroma angusta, Anal. Pl. V fig. 4.			
92.	Guazuma tomentosa	...	...	.. cvii.

XVII.—TILIACEÆ.

93.	Pityranthe verrucosa	..	...	... cix.
94.	Berrya Ammonilla	..	..	.. lviii.
95.	Grewia tiliæfolia	...	...	. cviii.
96.	Leptonychia moaccuroides	..	.	.. cxiv
97.	Erinocarpus Nimmonii	..	...	.. cx.
98.	Elæocarpus amœnus	...	..	... cxi.
99.	,, ferrugineus	..	..	... cxii
100.	,, tuberculatus	..	..	.. cxiii.
101.	,, venustus	..	...	.. clxxiv.
	Monocera tuberculata	..	..	... cxiii.
	Monocera ferruginea	..	..	.. cxii.

XVIII.—LINEÆ.

102.	Erythroxylon Indicum	...	...	.. lxxxi
	Sethia Indica. ...	..	...	... lxxxi.

XIX.—GERANIACEÆ.

103.	Averrhoa Bilimbi	...	..	.. cxvii.

XX.—RUTACEÆ.

Tab.

104. Melicope Indica, Anal. Pl. VI. fig. 1.
105. Evodia triphylla, Anal. Pl. VI. fig. 2.
Fagara triphylla, Anal. Pl. VI. fig. 2.
Xanthoxylum triphyllum, Anal. Pl. VI. fig. 2.
106. Xanthoxylum Rhetsa, Anal. Pl. VI. fig. 3.
107. „ ovalifolium, Anal. Pl. VI. fig. 3.
108. Acronychia pedunculata, Anal. Pl. VI. fig. 4.
Cyminosma pedunculata, Anal. Pl. VI. fig. 4.
109. Toddalia aculeata, Anal Pl. VI. fig. 5.
110. Glycosmis pentaphylla, Anal. Pl. VI. fig. 6.
111. Micromelum pubescens, Anal. Pl. VII. fig. 1.
112. Murraya exotica, Anal. Pl. VII. fig. 2.
113. Clausena Willdenovii, Anal. Pl. VII. fig. 3
114. Limonia alata, Anal. Pl. VII. fig. 4.
115. Atalantia monophylla, Anal. Pl. VII. fig. 5.
Sclerostylis. See Atalantia.
116. Citrus sp., Anal. Pl. VII. fig. 6.
117. Feronia elephantum ... . cxxi.
118. Ægle marmelos .. .. clxi.

XXI.—SIMARUBEÆ.

119. Ailanthus Malabarica ... ... cxxii.
120. Samadera Indica, Anal. Pl. VIII. fig. 1.
121. Balanites Ægyptiaca, Anal. Pl. VIII. fig. 2.

XXII.—OCHNACEÆ.

122. Ochna squarrosa, Anal. Pl. VIII. fig. 3.
123. Gomphia angustifolia, Anal. Pl. VIII. fig. 4.

XXIII.—BURSERACEÆ.

124. Boswellia glabra ... ... cxxiv.
125. Garuga pinnata .. .. cviii.
126. Balsamodendron Berryi ... . cxxvi.
127. Protium caudatum .. .. cxxv.
Protium Gileadense .. .. cxxvi.
128. Canarium brunneum .. ... cxxvii.
129. „ strictum ... ... cxxviii & Anal. Pl. XVIII. fig 1.
130. Filicium decipiens ... ... cxxix.
Rhus decipiens ... ... cxxix.
Pteridophyllum. See Filicium.
Amyris Gileadensis ... . cxxvi.

XXIV.—MELIACEÆ.

131. Melia composita ... . xii.
132. Melia Azadirachta ... . xiii.
133. „ Azedarach ... . xiv.
Azadirachta. See Melia.
134 Mallea Rothii, Anal. Pl. VIII. fig. 5.
Ekebergia. See Mallea.
135. Dysoxylon macrocarpum .. .. cl.
136. Sandoricum Indicum ... ... cccxix.
137. Aglaia Roxburghiana ... .. cxxx.
138. Amoora Rohituka .. .. cxxxii.
139. „ Lawii ... ... cxxxiii.
Milnea. See Aglaia.
Nemedra. See Aglaia.
Nimmonia. See Amoora.
140. Lansium Anamallayanum ... ... cxxxi.
141. Walsura piscidia, Anal. Pl. VIII. fig. 6.
142. Heynea affinis ... ... cxxxiv.
Heynea trijuga .. .. cxxxiv.
143. Beddomea simplicifolia ... ... cxxxv.
144. Carapa Moluccensis .. .. cxxxvi.
Xylocarpus granatum ... . cxxxvi.

				Tab.
145	Soymida febrifuga	..	..	viii.
146.	Chickrassia tabularis	..	...	... xi.
147.	Cedrela toona	...	...	... x.
148	Chloroxylon Swietenia	..	...	.. xi.

XXV.—CHAILLETIACEÆ.

149. Chailletia gelonioides, Anal Pl. IX. fig. 1.
Moacurra gelonioides, Anal Pl. IX. fig. 1.

XXVI.—OLACINEÆ.

150 Olax Wightiana, Anal. Pl IX. fig 2.
151. Strombosia Ceylanica cxxxvii
152. Anacolosa densiflora ... . cxxxviii.
153. Opilia amentacea, Anal. Pl. IX fig. 3.
Sphærocarya leprosa .. ... cxxxvii.
154 Lasianthera apicaulis ... . cxxxix.
Urandra. See Lasianthera
155. Gomphandra coriacea, Anal. Pl. IX fig. 4.
Platea. See Gomphandra.
156. Apodytes Benthamiana .. .. xl.
157. Mappia fœtida ... . xli.
Stemonurus fœtidus ... . cxli.

XXVII.—ILICINEÆ

158. Ilex denticulata ... . cxlii.
159. ,, Malabarica ... . cxliii.
160. ,, Wightiana ... . cxliv.

XXVIII.—CELASTRINEÆ.

161. Euonymus crenulatus .. .. cxliv.
162. Glyptopetalum zeylanicum, Anal. Pl. IX. fig. 5.
163. Microtropis ramiflora, Anal. Pl. IX. fig. 6.
164. Lophopetalum Wightianum .. .. cxlv.
165. Kokoona zeylanica ... . cxlvi.
166. Pleurostylia Wightii, Anal. Pl X fig. 1.
167. Celastrus Senegalensis, Anal. Pl X. fig. 2.
Celastrus montana, Anal. Pl. X. fig. 2.
168. Kurrimia Ceylanica ... . cxlvii.
169. ,, Indica .. .. .. cxx.
Trochisandra Indica .. .. cxx.
170. Elæodendron Roxburghii ... . cxlviii.
Neerija. See Elæodendron
171. Hippocratea Arnottiana, Anal Pl. X. fig. 3.
172. Salacia oblonga, Anal. Pl X. fig. 4.

XXIX.—RHAMNEÆ.

173. Zizyphus jujuba ... ... cxlix.
174. Colubrina Asiatica, Anal. Pl. X. fig. 5.
175. Rhamnus hirsutus, Anal Pl X. fig 6.
176. Scutia Indica, Anal. Pl. XI. fig. 1.

XXX.—SAPINDACEÆ.

177. Hemigyrosa canescens cli
,, deficiens ccxxxi
178. Schmidelia hispida ... . clii.
179. Schleichera trijuga ... . cxix.
180. Glennica zeylanica .. .. cliii.
181. Sapindus emarginatus ... . cliv.
Sapindus unijugus ... . clii.
Ornitrophe. See Schmidelia
Allophyllus. See Schmidelia
Cupania canescens .. .. cli.
182. Nephelium stipulaceum ... .. clv.
183. Pometia eximea ... ... clvii.
184. Euphoria Longana ... ... clvi.
Scytale Longana .. .. clvi.

				Tab.
	Dimocarpus Longana	...	...	.. clvi.
	Nephelium Longana	..	...	.. clvi.
185.	Harpullia imbricata	...	...	.. clviii.
186.	Dodonœa viscosa, Anal. Pl. XI. fig. 2.			
	Dodonœa Burmaniana, Anal. Pl. XI. fig. 2.			
187.	Turpinia Nepalensis	...	..	... clix.
	Streptostigma. See Harpullia.			
	Otonychium. See Harpullia.			
	Eccemanthus. See Pometia.			

XXXI.—SABIACEÆ.

188.	Meliosma Arnottiana	...	..	... clx.
189.	,, pungens	...	...	... clx.
	Millingtonia Arnottiana	...	...	... clx.

XXXII.—ANACARDIACEÆ.

190.	Rhus Mysorensis, Anal. Pl. XI. fig. 3.			
191.	Mangifera Indica	..	...	... clxii.
192.	Anacardium occidentale	...	...	.. clxiii.
193.	Gluta Travancorica	...	...	... lx.
194.	Nothopegia Colebrookiana	...	...	... clxiv.
	Glycicarpus. See Nothopegia.			
195.	Buchanania latifolia	...	...	... clxv.
196.	Solenocarpus Indica	..	...	... ccxxxiii.
197.	Odina Wodier ...	...	..	... cxxlii.
198.	Semecarpus Anacardium	..	..	... clxvi.
199.	,, Travancorica	...	...	.. ccxxxii.
200.	Holigarna longifolia	...	...	.. clxvii.
201.	Campnosperma Zeylanica	...	..	... clxviii.
202.	Spondias mangifera	...	...	... clxix.

XXXIII.—CONNARACEÆ.

203.	Rourea santaloides, Anal. Pl. XI. fig. 4.			
204.	Connarus pinnatus, Anal. Pl. XI. fig. 5.			
205.	Ellipanthus unifoliatus	..	...	... clxx.

XXXIV.—LEGUMINOSÆ.

206.	Indigofera pulchella, Anal. Pl. XII. fig. 1.			
207.	Mundulea suberosa, Anal. Pl. XII. fig. 2.			
	Robinia suberosa, Anal. Pl. XII fig. 2.			
	Tephrosia suberosa, Anal. Pl. XII. fig. 2.			
208.	Sesbania Ægyptiaca, Anal. Pl. XII. fig. 3.			
209.	Ougeinia dalbergioides	...	..	.. xxxvi.
210.	Desmodium cephalotes, Anal. Pl. XII. fig. 4.			
211.	Erythrina stricta	..	...	... clxxv.
212.	,, Indica	...	...	... clxxv.
213.	Butea frondosa ...	...	..	... clxxvi.
214.	Dalbergia latifolia	..	...	... xxiv.
215.	,, Sissoo	..	..	... xxv.
	Dalbergia Mooniana	...	...	... clxxxvii.
216.	Pterocarpus marsupium	...	...	... xxi.
217.	,, santalinus	..	...	... xxii.
218.	,, Indicus	...	...	.. xxiii.
219.	Pongamia glabra	...	...	.. clxxvii.
220.	Calpurnia aurea, Anal. Pl. XII. fig. 5.			
	Virgilia aurea, Anal. Pl. XII. fig. 5			
221.	Sophora interrupta, Anal. Pl. XII. fig. 6.			
222.	Ormosia Travancorica	...	...	.. xlv.
223.	Pericopsis Mooniana	...	...	... clxxxvii.
224.	Cæsalpinia Sapan, Anal. Pl. XII. fig. 1.			
225.	Acrocarpus fraxinifolius	..	...	... xliv.
226.	Poinciana elata ...	...	..	... clxxviii.
227.	Parkinsonia aculeata, Anal. Pl. XIII. fig. 2.			
228.	Cassia florida ...	..	..	.. clxxix.
229.	Cassia Roxburghii	..	...	... clxxx.

				Tab.
230.	Dialium ovoideum	..	..	... clxxxi.
231.	Bauhinia racemosa	...	...	.. clxxxii.
232.	Humboldtia unijuga	...	...	... clxxxiii.
233.	Tamarindus Indica	..	.	... clxxxiv.
234.	Saraca Indica	...	..	... lvii.
	Jonesia Asoca ...	..	...	.. lvii.
235.	Crudia Zeylanica	..	...	... cxc.
236.	Hardwickia binata	...	...	... xxvi.
237.	,, pinnata	...	...	... cclv.
238.	Cynometra ramiflora	..	...	... cccxv.
239.	,, cauliflora	...	..	... cccxv.
240.	,, Travancorica	...	..	.. cccxvi.
241.	Adenanthera pavonina	...	...	.. xlvi.
242.	Prosopis spicigera	..	...	... lvi.
243.	Dichrostachys cinerea	...	...	... clxxxv.
244.	Xylia dolabriformis	...	...	.. clxxxvi.
	Inga xylocarpa	..	...	... clxxxvi.
245.	Acacia Arabica	..	...	.. xlvii.
246.	,, leucophloea	..	..	... xlviii.
247.	,, Catechu	...	..	... xlix.
248.	,, Sundra	..	..	... l.
249.	,, ferruginea	...	...	... li.
250.	,, farnesiana	...	..	... lii.
	Acacia speciosa	..	...	... liii.
	Acacia odoratissima	...	...	... liv.
	Acacia stipulata	...	...	... lv.
	Acacia amara	...	...	.. lxi.
251.	Albizzia Lebbeck	...	...	... liii.
252.	,, odoratissima	...	...	... liv.
253.	Albizzia stipulata..	...	..	... lv.
254.	,, amara ...	..	...	... lxi.
	Albizzia speciosa ..	..	..	... liii.
255.	Pithecolobium dulce	...	..	... clxxxviii.
256.	,, Anamalayanum	...	...	... clxxxix.
257.	Calliandra cynometroides	...	..	.. cccxvii.

XXXV.—ROSACEÆ.

258.	Parinarium Indicum	...	...	.. cxci.
259.	Pygeum Ceylanicum	...	...	lix.
	Pygeum acuminatum	..	...	.. lix.
	Polyodontia. See Pygeum.			
260.	Cotoneaster buxifolia, Anal. Pl. XIII. fig. 3.			
261.	Photinia Notoniana	..	...	... cxcii.

XXXVI.—RHIZOPHORACEÆ.

262.	Rhizophora mucronata, Anal. Pl. XIII. fig. 4.			
	Rhizophora candelaria, Anal. Pl. XIII. fig 4.			
263.	Ceriops Candolleana, Anal. Pl. XIII. fig. 5.			
264.	Kandelia Rheedii, Anal. Pl. XIII. fig. 6.			
265.	Bruguiera Rheedii, Anal. Pl. XIV. fig. 1.			
266.	Carallia integerrima	..	...	... cxciii.
267.	Weihea Zeylanica...	...	...	... cxciv.
	Anstrutheria. See Weihea.			
268.	Blepharistemma corymbosa, Anal. Pl. XIV. fig. 2.			
269.	Anisophyllea Zeylanica	..	...	... cxcv.
	Tetracrypta. See Anisophyllea.			

XXXVII.—COMBRETACEÆ.

270.	Terminalia tomentosa	..	...	... xvii.
271.	,, paniculata	...	...	... xviii.
272.	,, Arjuna	...	...	.. xxviii.
273.	,, Belerica	..	...	... xix.
274.	,, catappa	...	..	.. xx.
275.	,, chebula	...	...	... xxvii,
	Terminalia glabra	...	..	... xvii.
	Terminalia coriacea	..	...	... xvii.

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					Tab
276.	Anogeissus latifolius	...	..	..	xv.
277.	,, acuminatus	..	..	...	xvi.
	Conocarpus latifolius	...	..	...	xv.
	Conocarpus acuminatus		.	..	xvi.
278.	Lumnitzera racemosa, Anal. Pl. XXI. fig 2.				
279.	Gyrocarpus Jacquini	..	...	..	cxcvi.

XXXVIII.—MYRTACEÆ.

280.	Rhodomyrtus tomentosus, Anal. Pl. XIV. fig. 3.				
281.	Eugenia jambolana	..	...	...	cxcvii.
282.	,, Malabarica	...	..	.	cxcix
283.	,, alternifolia	..	...	...	cxcviii.
284.	,, Zeylanica	..	...	...	ccii.
285	,, cylindrica	...	...	..	cci.
286.	,, hemisphærica	...	...	...	cciii.
287.	,, floccosa	...	...	..	cc.
	Syzygium jambolanum	...		...	cxcvii
	Syzygium alternifolium	...	...	...	cxcviii.
	Acmene zeylanica	..	..	...	ccii.
	Jambosa cylindrica	..	...	...	cci.
	Strongylocalyx hemisphærica	...	...	...	cciii
288.	Barringtonia acutangula	..	...	..	cciv.
289	Careya arborea				cov and Anal Pl. XVIII fig 2.

XXXIX.—MELASTOMACEÆ.

290.	Memecylon umbellatum	...	...	...	ccvi.
291.	,, capitellatum	...	...	..	ccvi.

XL.—LYTHRARIEÆ.

292.	Woodfordia tomentosa, Anal Pl. XIV. fig. 4.				
	Grislea tomentosa, Anal Pl XIV. fig 4.				
293.	Pemphis acidula, Anal Pl. XIV. fig 5.				
	Maclellandia Griffithiana, Anal Pl. XIV. fig 5.				
294.	Lawsonia alba, Anal. Pl. XIV. fig 6.				
295.	Lagerstrœmia Reginæ	..	...	..	xxix.
296.	,, microcarpa	...	..	...	xxx.
297.	,, parviflora	...	...	..	xxxi.
298.	,, lanceolata	..	...	...	xxxii.
299.	Sonneratia acida, Anal. Pl. XV fig. 1.				
300.	Axinandra Zeylanica	..	...	...	ccvii.

XLI.—SAMYDACEÆ.

301	Casearia varians	..	..	...	ccviii.
302.	Osmelia Gardneri	...	...	...	ccix.
303.	Homalium Ceylanicum	...	...	..	ccx.
304.	Homalium Travancoricum	...	...	...	ccxi.
	Blackwellia tetrandra	..	...	..	ccx.
	Cordylanthus. See Homalium				

XLII.—DATISCEÆ.

305.	Tetrameles nudiflora		...	...	ccxii.
	Tetrameles Grahamiana	..	..		ccxii

XLIII.—ARALIACEÆ.

306.	Aralia Malabarica, Anal. Pl XV fig 2.				
307.	Pentapanax Leschenaultii, Anal Pl XV fig. 3.				
308.	Polyscias acuminata	...	...	...	ccxiii.
309.	Heptapleurum racemosum	...	..	.	ccxiv.
310.	*Hedera acuminata*	...	..	...	ccxiii.
	Hedera racemosa		...	...	ccxiv.

XLIV.—CORNACEÆ.

311.	Alangium Lamarckii	...	..	..	ccxv.
	Alangium decapetalum	...	...	..	ccxv.
	Alangium hexapetalum	..	..	...	ccxv,

				Tab.
312.	Mastixia arborea	...	...	... ccxvi.
	Bursinopetalum arboreum	..	...	... ccxvi.
	Bursinopetalum tetrandrum	...	..	... ccxvi.

XIV.—CAPRIFOLIACEÆ.

313.	Lonicera ligustrina, Anal. Pl. XV. fig. 5.			
314.	Viburnum punctatum	..	...	.. ccxvii.
	Viburnum acuminatum	...	...	... ccxvii.

XLVI.—RUBIACEÆ.

315.	Sarcocephalus cordatus	..	...	.. cccxviii.
	Nauclea cadamba. See Anthocephalus.			
316	Adina cordifolia	...	...	... xxxiii. and Anal. Pl. XXIX. fig. 2.
	Naucla cordifolia. See Adina.			
317.	Stephegyne parvifolia	...	..	... xxxiv. and Anal. Pl. XXIX. fig. 1.
	Nauclea parvifolia. See Stephegyne.			
318.	Anthocephalus cadambus	...	...	... xxxv.
319.	Nauclea elliptica, Anal. Pl. XXIX. fig. 3.			
	Nauclea coadunata	..	...	.. cccxviii.
320.	Hymenodyction obovatum	...	..	... ccxix.
321.	,, utile	..	...	... ccxix.
322.	Wendlandia Notoniana	...	...	.. ccxxiv.
323.	Byrsophyllum tetrandrum	..	...	... cccxxvi.
324	Gardenia lucida, Anal. XV. fig. 6.			
325.	,, turgida, Anal. Pl. XV. fig. 6.			
326.	Randia dumetorum, Anal. Pl. XVI. fig. 1.			
327	,, uliginosa, Anal. Pl. XVI. fig. 1.			
327*a*.	Nargedia macrocarpa	...	...	... cccxxviii.
328.	Webera Asiatica, Anal. Pl. XVI. fig. 2.			
	Stylocoryne Webera, Anal. Pl. XVI. fig 2			
329.	Diplospora apiocarpa	...	..	... ccxxiii.
	Discospermum apiocarpum	...	...	... ccxxiii.
330.	Mussænda frondosa, Anal. Pl. XVI. fig. 3.			
331.	Urophyllum Zeylanicum, Anal. Pl. XVI. fig. 5.			
	Axanthes zeylanica, Anal. Pl. XVI. fig. 5.			
332.	Ixora parviflora	...	..	... ccxxii.
333.	Pavetta involucrata, Anal. Pl. XXIX. fig. 6.			
334.	Coffea Arabica, Anal. Pl. XVIII fig. 1.			
335	Scyphiphora Malayana, Anal. Pl. XXIX. fig. 5.			
336.	Timonius jambosella, Anal. Pl. XVI. fig. 4.			
337.	Dichilanthe Zeylanica, Anal Pl. XV. fig. 4.			
338.	Guettarda speciosa, Anal Pl. XVII. fig 2.			
339.	Scyphostachys coffeoides, Anal. Pl. XVI. fig. 6.			
340.	Plectronia didyma	...	...	... ccxxi.
	Canthium. See Plectronia.			
	Canthium umbellatum	...	..	.. ccxxi.
341.	Morinda citrifolia	...	...	.. ccxx.
342.	Prismatomeris albidiflora, Anal. Pl. XXIX. fig. 4.			
343.	Lasianthus venulosus, Anal. Pl. XVII. fig. 5.			
	Mephitidea. See Lasianthus.			
344.	Hamiltonia suaveolens, Anal. Pl. XVII. fig. 3.			
345.	Psychotria elongata, Anal. Pl. XVII. fig. 6.			
346.	Saprosma Wightii, Anal. Pl. XVII. fig 4.			
346*a*.	Octotropis Travancorica	...	...	... cccxxvii.
	Grumilea. See Psychotria.			
	Dysodidendron. See Saprosma			
	Epithinia. See Scyphiphora.			
	Serissa. See Saprosma.			
	Nelitris jambosella, Anal. Pl. XVI. fig. 4			
	Eupyrena glabra, Anal. Pl. XVI. fig. 4.			
	Griffithia. See Randia.			

XLVII.—COMPOSITÆ.

347.	Vernonia volkameriæfolia	..	...	.. ccxxv.
348.	Vernonia Wightiana	..	...	... ccxxvi.
	Monosis. See Vernonia.			

Tab.

XLVIII.—ERICACEÆ.

349. Vaccinium Leschenaultii ccxxvii
350. Gualtheria fragrantissima, Anal. Pl. XIX. fig. 1.
Gualtheria Leschenaultii, Anal. Pl. XIX. fig. 1.
351. Rhododendron arboreum ... . ccxxviii.

XLIX.—MYRSINEÆ.

352. Mæsa Indica, Anal. Pl. XVIII. fig. 4.
353 Embelia robusta, Anal. Pl. XIX. fig. 2.
354. Myrsine capitellata .. .. ccxxxiv.
355. Ardisia amplexicaulis, Anal. Pl. XVIII. fig. 3.
356. Ægiceras majus, Anal. Pl. XIX. fig. 3.

L.—SAPOTACEÆ.

357. Bassia latifolia ... ... xli.
358. ,, longifolia ... ... xlii.
359. ,, elliptica ... . xliii.
360. ,, neriifolia ... ... ccliv.
361. ,, petiolaris .. .. ccliv.
362. ,, grandis ... . ccliv.
Isonandra acuminata .. .. xliii.
Dasyaulus. See Bassia.
Dichopsis. See Bassia.
363. Mimusops elengi .. .. xl.
364. Achras elengioides ... . ccxxxv.
Sapota elengioides ... . ccxxxv.
365. Chrysophyllum Roxburghii ... . ccxxxvi.

LI.—EBENACEÆ.

366 Diospyros ebenum ... ... lxv.
367. ,, Tupru ... . lxvi.
,, *exsculpta* ... . lxvi.
368. ,, melanoxylon ... ... lxvii.
,, *Wightiana* ... ... lxvii.
369. ,, foliolosa ... ... lxviii.
,, *calycina* ... ... lxviii.
370. ,, embryopteris ... ... lxix.
Embryopteris glutinosa . ... lxix.
371. Maba oblongifolia, Anal. Pl. XXI. fig. 1.
Macreightia oblongifolia, Anal. Pl. XXI. fig. 1
372. Maba buxifolia, Anal. Pl. XIX. fig. 4.

LII.—STYRACEÆ.

373. Symplocos Gardneriana ... .. ccxxxvii.
374. ,, oligandra, Anal. Pl. XX. fig 1.

LIII.—JASMINEÆ.

375. Nyctanthes arbor-tristis ... . ccxl.
376. Olea glandulifera ccxxxviii
377. Ligustrum Perottetti, Anal. Pl. XIX. fig 5.
378. Chionanthus intermedia .. ... ccxxxix.
379. ,, Malabarica ... ... ccxxxix.

LIV.—APOCYNEÆ

380. Willughbeia Ceylanica, Anal Pl. XX. fig. 4.
381. Ophioxylon densiflorum, Anal. Pl. XX. fig. 2.
Ophioxylon Neilgherriense, Anal. Pl. XX. fig. 2.
382. Carissa carandas, Anal. Pl. XIX. fig. 6.
383. Hunteria Zeylanica ... ... cclxv.
384. Alyxia Ceylanica, Anal. Pl. XX. fig. 5.
385. Tabernamontana verticellata, Anal. Pl. XX. fig. 3.
386. Wrightia tinctoria .. .. ccxli.
387. Alstonia scholaris ... . ccxlii.
388. Holarrhena antidysenterica, Anal. Pl. XX. fig. 6.

Tab.

LV.—LOGANIACEÆ.

389. Strychnos nux-vomica ... .. . ccxliii.
390. Buddleia Asiatica, Anal. Pl. XXI. fig. 4.
391. Fagræa Coromandelina ... ... ccxliv.
392. Gærtnera Kænigii, Anal. Pl. XXI. fig. 3.

LVI.—BORAGINEÆ.

393. Cordia Wallichii ... . ccxlv.
394. ,, myxa ... . ccxlv.
395. Ehretia lævis ccxlvi

LVII.—SALVADOREÆ.

396. Salvadora Wightiana ... . ccxlvii.

LVIII.—BIGNONIACEÆ.

397. Bignonia xylocarpa ... . lxx.
398. Millingtonia hortensis ccxlix.
399. Spathodea falcata ... . lxxi.
400. Stereospermum chelonoides ... . lxxii.
401. Pajanelia Rheedii, Anal. Pl. XXI. fig. 5.
402. Schrebera swietenioides ... . ccxlviii.

LIX.—VERBENACEÆ.

403. Vitex altissima .. .. cclii.
404. Gmelina arborea ... ... celiii.
405. Premna tomentosa .. .. ccli.
406. Callicarpa lanata, Anal. Pl. XXI. fig. 6.
407. Clerodendron infortunatum, Anal. Pl. XXII. fig. 1.
408. Tectona grandis ... ... cel.
409. Avicennia officinalis, Anal. Pl. XXII. fig. 2.

LX.—NYCTAGINEÆ.

410. Pisonia aculeata, Anal. Pl. XXII. fig. 3.

LXI.—MYRISTICEÆ.

411. Myristica laurifolia .. .. celxvii.
412. ,, magnifica ... . celxviii.
413. ,, Malabarica ... . celxix.
414. ,, Farquhariana .. .. celxx.
415. ,, corticosa ... . celxxi.
Knema. See Myristica.
Pyrrhosia. See Myristica.
Horsfieldia. See Myristica.

LXII.—MONIMIACEÆ.

416. Hortonia floribunda, Anal. Pl. XXV. fig. 3.

LXIII.—PROTEACEÆ.

417. Helicia robusta ccci

LXIV.—THYMELÆACEÆ.

418. Wikstræmia virgata, Anal. Pl. XXV. fig. 4.
419. Lasiosiphon eriocephalus, Anal. Pl. XXV. fig. 2.
Gnidia eriocephalus, Anal. Pl. XXV. fig. 2.
420. Cansjera Rheedii, Anal. Pl. XXVI. fig. 6.
421. Gyrinops Walla .. .. cccii.
422. Phaleria cauliflora, Anal. Pl. XXV. fig. 5.
Drymispermum. See Phaleria.

LXV.—ELÆAGNACEÆ.

423. Elæagnus latifolia, Anal. Pl. XXV. fig. 1.

Tab.

LXVI.—SANTALACEÆ.

424. Pyrularia Wallichiana .. .. ccciv.
425. Santalum album ... . cclvi.
426. Osyris arborea, Anal. Pl. XXVI. fig. 6-A.

LXVII.—SALICACEÆ.

427. Salix tetrasperma ... ... cccii.

LXVIII.—LAURACEÆ.

428. Cinnamomum Zeylanicum ... . cclxii.
429. Apollonias Arnotii ... . ccxci.
430. Phœbe Wightii ... . cxcii.
431. Haasia Wightii .. .. ccxcviii.
432. Machilus macrantha ... ... cclxiv.
433. Alseodaphne semicarpifolia ... ... ccxcvii.
434. Beilschmiedia fagifolia ... ... clxiii.
435. Cryptocarya Wightiana .. .. ccxcix.
436. Tetranthera Wightiana ... ... ccxciii.
437. *Cylicodaphne.* See Tetranthera.
438. *Lepidadenia.* See Tetranthera.
439. Actin aphne salicina cxcv
440. ,, Hookeri ... ... cxcvi.
441. ,, angustifolia ... ... cxcv.
442. Litsœa zeylanica ... ... ccxciv.
443. Hernandia peltata ... ... ccc.

LXIX.—EUPHORBIACEÆ.

444. Actephila excelsa, Anal. Pl. XXIII. fig. 3.
Anomopsermum. See Actephila.
445. Phyllanthus emblica ... . cclviii.
446. ,, Indicus, Anal. Pl. XXIV. fig. 6.
Emblica officinalis .. .. cclviii.
Prosorus India, Anal. Pl. XXIV. fig. 6.
447. Glochidion Neilgherriense ... . cclxxvii.
448 Breynia rhamnoides, Anal. Pl. XXIV. fig. 2.
Melanthesa. See Breynia.
449. Putranjiva Roxburghii ... . cclxxv.
450. ,, Zeylanica ... . clxxv.
Palenga. See Putranjiva.
451. Securinega leucopyrus, Anal. Pl. XXIV. fig. 4 ♂ only
Flueggia. See Securinega.
452. Mischodon Zeylanicus .. .. .. ccxc.
453. Baccaurea sapida .. .. cclxxx.
Pierardia. See Baccaurea.
454. Bischoffia Javanica ... . cclix.
Andrachne. See Bischoffia.
Stylodiscus. See Bischoffia.
Microelus. See Bischoffia.
455. Hemicyclia elata ... ... cclxxix.
456. Cyclostemon macrophyllus ... . cclxxviii.
Sphragidia. See Cyclostemon.
457. Aporosa Lindleyana .. .. cclxxxvi.
Seepa Lindleyana. See Aporosa.
458. Antidesma Bunius, Anal. Pl. XXIV. fig. 3.
459. Briedelia retusa .. .. cclx.
Briedelia spinosa ... . cclx.
460. Cleistanthus patulus, Anal. Pl. XXIV. fig. 4.
461. ,, pallidus, Anal. Pl. XXIV. fig. 4.
Amanoa. See Cleistanthus.
462. Lebidieropsis orbicularis, Anal. Pl. XXIV. fig. 5.
Cluytia collina. See Lebidieropsis.
463. Croton scabiosum .. .. cclxxxiii.
464. ,, aromaticum ... ... cclxxxiii.

				Tab.
465.	Aleurites Moluccana	..	..	... cclxxvi.
	Aleurites triloba	...	...	... cclxxvi.
466.	Agrostistachys Indica, Anal. Pl. XXIV fig. 2.			
467.	Sarcoclinium longifolium, Anal. Pl. XXIV. fig. 1.			
468.	Cœlodepas calycina	...	...	... cccxx.
469.	Cephalocroton Indicum	...	...	. cclxi.
	Adenochlœna. See Cephalocroton.			
470.	Podadenia Thwaitesii	..	...	.. cclxxxii.
471.	Trewia nudiflora	...	..	... cclxxxi.
472.	Mallotus Philippinensis	...	...	... cclxxxix.
	Rottlera urandra. See Cleidion.			
	Rottlera tinctoria. See Mallotus.			
	Rottlera Thwaitesii. See Podadenia.			
473.	Cleidion Javanicum	...	..	... cclxxii.
	Tetraglossa. See Cleidion.			
474.	Macaranga Indica	..	...	.. cclxxxvii.
475.	,, tomentosa	...	...	.. cclxxxvii.
476.	Homonoya riparia, Anal. Pl. XXIV. fig. 1.			
	Adelia. See Homonoya.			
	Spathiostemon. See Homonoya.			
	Hœmatospermum. See Homonoya.			
477.	Givotia rottleriformis	..	..	... cclxxxv.
478	Trigonostemon Lawianus	...	...	... cclxxiii.
	Dimorphocalyx. See Trigonostemon.			
479.	Ostodes Zeylanica	..	...	... cclxxiv.
	Desmostemon. See Ostodes.			
480.	Codiœum umbellatum, Anal. Pl. XXIII. fig. 6.			
	Blachia. See Codiœum.			
481.	Chœtocarpus castanocarpus	...	...	... cclxxxiv.
482.	,, coriaceus	...	...	... cclxxxiv.
483.	Gelonium lanceolatum, Anal. Pl. XXII. fig. 6.			
484.	Excœcaria Cochinchinensis, Anal. Pl. XXII. fig. 5.			
485.	,, insignis, Anal. Pl. XXII. fig. 5.			
	Falconeria. See Excœcaria.			
486.	Euphorbia antiquorum, Anal. Pl. XXII. fig. 4.			
487.	Daphniphyllum glaucescens	...	..	... cclxxxviii.
	Daphniphyllum Roxburghii	..	...	.. clxxxviii.
	Goughia. See Daphniphyllum.			
488.	Sarcococca saligna, Anal. Pl XXIV. fig. 5.			
	Sarcococca trinervia, Anal. Pl. XXIV. fig. 5.			

LXX.—URTICEÆ.

489.	Ulmus integrifolia	...	...	... cccx.
490.	Sponia Wightii	...	..	.. cccxi.
491.	Celtis Roxburghii	..	...	... cccxii.
	Celtis trinervia	...	...	... cccxii.
492.	Gironniera reticulata	..	..	... cccxiii.
493.	,, subæqualis	...	..	.. cccxiii.
	Helminthospermum. See Gironniera.			
	Holoptelœa. See Ulmus.			
494.	Artocarpus hirsuta	...	.	... cccviii.
495.	,, nobilis	...	...	... cccix.
	Lepurandra. See Antiaris			
496.	Antiaris innoxia	...	...	.. cccvii.
	Antiaris saccidora	..	..	.. cccvii.
497.	Ficus religiosa	...	...	... cccxiv.
498.	,, Tsiala	..	...	... cccxiv.
	Urostigma. See Ficus.			
499.	Allœanthus Zeylanicus	..	...	... cccv.
500.	Streblus aspera, Anal. Pl. XXVI fig. 1.			
	Trophis aspera. See Streblus.			
	Epicarpurus. See Streblus and Taxotrophis.			
501.	Cudranus Rumphii, Anal. Pl. XXVII. fig. 1.			
	Trophis spinosa. See Cudranus and Taxotrophis.			
	Maclura. See Cudranus.			

Tab.

502. Plecospermum spinosum, Anal. Pl. XXVI. fig. 2.
Batis spinosa. See Plecospermum.
503. Taxotrophis Roxburghii, Anal. Pl. XXVI. fig. 3.
504. ,, Zeylanica, Anal. Pl. XXVI. fig 3.
505. Bohmeria Travancorica, Anal. Pl. XXVII. fig. 2.
506. Laportea crenulata ... . ccovi.
Urtica crenulata. See Laportea.
507. Morocarpus longifolius, Anal. Pl. XXVI. fig. 5.
Debregeasia velutina. See Morocarpus.
508. Oreocnido sylvatica, Anal. Pl. XXVI. fig. 4.
Villebrunea sylvatica. See Oreocnide.
Conocephalus niveus. See Morocarpus.

LXXI.—CONIFERÆ.

509. Podocarpus latifolia ... ... cclvii.

LXXII.—GRAMINEÆ

510. Arundinaria Wightiana, Anal. Pl. XXVIII. fig 1.
511. Bambusa arundinacea .. .. cccxxi.
512. Oxytenanthera Thwaitesii ... . cccxxii.
513. Teinostachyum Wightii cccxxiii
514. Beesha Travancorica ... . cccxxiv.
515. Dendrocalamus strictus .. .. cccxxv.

Addenda.

DIPTEROCARPEÆ.

516. Balanocarpus erosa, *Bedd.* ... ... cccxxix.
517. ,, utilis, *Bedd.* ... . cccxxx.

RUBIACEÆ.

518. Octotropis Travancorica, *Bedd.* ... ... cccxxvii.
519. Nargedia macrocarpa, *Thw.* ... ... cccxxviii.

ALPHABETICAL INDEX

TO THE TREES AND SHRUBS FIGURED.

The Italics are synonyms.

A.

			Tab.
Aberia Gardneri, Anal. Pl. II. fig. 5.			
Abroma angusta, Anal. Pl. V. fig. 4.			
Acacia amara	...	...	... lxi.
Acacia Arabica	...	...	... xlvii.
„ Catechu	...	...	... xlix.
„ Farnesiana	...	...	... lii
„ ferruginea	...	...	... li.
„ leucophlœa	..	...	... xlviii.
Acacia odoratissima	...	...	... liv.
Acacia speciosa	...	...	... liii.
Acacia stipulata	...	...	... lv.
Acacia sundra	...	...	... l.
Achras elengioides	...	...	... ccxxxv.
Acmene zeylanica	...	...	... ccii.
Acrocarpus fraxinifolius	...	...	... xliv.
Acronychia pedunculata, Anal. Pl. VI. fig. 4.			
Actephila excelsa, Anal. Pl. XXIII. fig. 3.			
Actinodaphne angustifolia	...	...	... cxcv.
„ Hookeri	...	...	... cxcvi.
„ salicina	...	...	... cxcv.
Adelia. See Homonoya			
Adenanthera pavonina	...	...	... xlvi.
Adenochlœna. See Cephalocroton.			
Adina cordifolia	...	...	xxxiii. & Anal. Pl. XXIX. fig. 2.
Adinandra lasiopetala, Anal. Pl. III. fig. 3.			
Ægiceras majus, Anal. Pl. XIX. fig. 3.			
Ægle marmelos	...	...	... clxi.
Aglaia Roxburghiana	...	...	... cxxx.
Agrostistachys Indica, Anal. Pl. XXIV. fig. 2.			
Ailanthus Malabarica	...	...	... cxxii.
Alangium decapetalam	...	...	... ccxv.
Alangium hexapetalum	..	...	... ccxv.
Alangium Lamarckii	...	...	... ccxv.
Albizzia amara	...	...	.. lxi.
„ Lebbeck	...	...	... liii.
„ odoratissima	...	...	... liv.
Albizzia speciosa	...	...	... liii.
Albizzia stipulata	...	...	... lv.
Aleurites Moluccana	...	...	... colxxvi.
Aleurites triloba	...	...	... cclxxvi.
Alloœanthus Zeylanicus	...	...	... cccv.
Allophyllus. See Schmidelia.			

			Tab.
Alphonsea Madrasapatana	...	...	... lxxvi.
Alseodaphne semicarpifolia	...	...	... ccxcvii.
Alsodeia zeylanica	...	...	... ccxxix.
Alstonia scholaris	...	...	... ccxlii.
Alyxia Ceylanica, Anal. Pl. XX. fig. 5.			
Amanoa. See Cleistanthus.			
Amoora Lawii	...	...	... cxxxiii.
,, Rohituka	...	...	. cxxxii.
Amyris Gileadensis	...	...	... cxxvi.
Anacardium occidentale	...	...	... clxiii.
Anacolosa densiflora	. .	...	... cxxxviii.
Andrachne. See Bischoffia.			
Anisophyllea Zeylanica	...	...	... cxcv.
Anogeissus acuminatus	...	...	... xvi.
,, latifolius	...	...	... xv.
Anomospermum. See Actephila.			
Anstrutheria. See Weihea.			
Anthocephalus Cadambus	...	...	. xxxv.
Antiaris innoxia	...	...	... cccvii.
Antiaris saccidora	...	..	... cccvii.
Antidesma Bunius, Anal. Pl. XXIV. fig. 3.			
Apodytes Benthamiana	...	...	... cxl.
Apollonias Arnottii	..	...	... ccxci.
Aporosa Lindleyana	...	...	... cclxxxvi.
Aralia Malabarica, Anal. Pl. XV. fig. 2.			
Ardisia amplexicaulis, Anal. Pl. XVIII. fig. 3.			
Artocarpus hirsutus	...	...	... cccviii.
,, nobilis	...	...	... cccix.
Arundinaria Wightiana, Anal. Pl. XXVIII. fig. 1.			
Atalantia monophylla, Anal. Pl. VII. fig. 5.			
Averrhoa Bilimbi	...	...	.. cxvii.
Avicennia officinalis, Anal. Pl. XXII. fig. 2.			
Axanthes Zeylanica, Anal. Pl. XVI. fig. 5.			
Axinandra Zeylanica	...	...	... cccvii.
Azadirachta. See Melia.			

B.

Baccaurea sapida	...	...	... cclxxx.
Balanites Ægyptiaca, Anal. Pl. VIII. fig. 2.			
Balanocarpus erosa	...	...	... cccxxix.
,, utilis	...	...	... cccxxx.
Balsamodendron Berryi	...	...	... cxxvi.
Bambusa arundinacea	...	...	... cccxxi.
Barringtonia acutangula	...	...	... cciv.
Bassia elliptica	...	...	... xliii.
,, grandis	...	...	... ccliv.
,, latifolia	...	...	... xli.
,, longifolia	...	...	... xlii.
,, neriifolia	...	...	... ccliv.
,, petiolaris	...	...	... ccliv.
Batis spinosa. See Plecospermum.			
Bauhinia racemosa	...	...	... clxxxii.
Beddomea simplicifolia	...	...	... cxxxv.
Beesha Travancorica	...	...	... cccxxiv.
Beilschmiedia fagifolia	...	...	... clxiii
Berberis Leschenaultii, Anal. Pl. II. fig. 2.			
Berberis Nepalensis, Anal. Pl. II. fig. 2.			

				Tab.
Berrya Ammonilla	...	...	...	lviii.
Bignonia xylocarpa	...	...	...	lxx.
Bischoffia Javanica	...	...	...	cclx.
Bixa Orellana	...	...	...	lxxix.
Blachia. See Codiæum.				
Blackwellia tetrandra	...	...	...	ccx.
Blepharistemma corymbosa, Anal. Pl. XIV. fig. 2.				
Bocagea Dalzellii, Anal. Pl. I. fig. 4.				
Bohmeria Travancoria, Anal. Pl. XXVII. fig. 2.				
Bombax heptaphylla	...	...	...	lxxxii.
Bombax Malabaricum	...	...	...	lxxxii.
Boswellia glabra	...	...	...	cxxiv.
Breynia rhamnoides, Anal. Pl. XXIV. fig. 2				
Briedelia retusa	...	...	...	cclx.
Briedelia spinosa	...	...	...	cclx.
Bruguiera Rheedii, Anal. Pl. XIV. fig. 1.				
Buchanania latifolia	...	...	...	clxv.
Buddleia Asiatica, Anal. Pl. XXI. fig. 4.				
Bursinopetalum arboreum	...	...	...	ccxvi.
Bursinopetalum tetrandrum	..	...	...	ccxvi.
Butea frondosa	...	...	...	clxxvi.
Byrsophyllum tetrandrum	...	...	...	cccxxvi,

C.

Cælodepas calycina	...	...	...	cccxx.
Cæsalpinia Sapan, Anal. Pl. XII. fig. 1.				
Calliandra cynometroides	...	...	...	cccxvii.
Callicarpa lanata, Anal. Pl. XXI. fig. 6.				
Calophyllum decipiens	...	...	...	xc.
Calophyllum elatum	...	...	...	ii.
Calophyllum spurium	...	...	...	xc.
Calophyllum Wightianum	...	...	...	xc.
Calpurnia aurea, Anal. Pl. XII. fig. 5.				
Calysaccion longifolium	...	...	...	lxxxix.
Campnosperma Zeylanica	...	...	...	clxviii.
Canarium brunneum	...	...	...	cxxvii.
„ strictum	...	...	cxxviii. and Anal. Pl. XVIII. fig 1.	
Canthium. See Plectronia				
Canthium umbellatum	...	...	..	ccxxi.
Cansjera Rheedii, Anal. Pl. XXVI. fig 6.				
Capparis stylosa, Anal. Pl. II. fig. 3.				
Carallia integerrima	...	...	...	cxciii.
Carapa Moluccensis	...	...	...	cxxxvi,
Careya arborea	...	...	ccv. and Anal. Pl. XVIII. fig. 2.	
Carissa carandas, Anal. Pl. XIX. fig. 6.				
Casearia varians	...	...	...	ccviii
Cassia florida	...	...	...	clxxix.
„ Roxburghii	...	...	...	clxxx.
Cedrela Toona	...	...	...	x.
Celastrus montana, Anal. Pl. X. fig. 2.				
Celastrus Senegalensis, Anal. Pl. X. fig. 2.				
Celtis Roxburghii	...	...	...	cccxii.
Celtis trinervia	...	...	...	cccxii.
Cephalocroton Indicum	...	...	...	cclxi.
Ceriops Candolleana, Anal. Pl. XIII. fig. 5.				
Chætocarpus castanocarpus	...	...	...	cclxxxiv.
„ coriaceous	...	...	...	cclxxxiv.

Tab.

Chailletia gelonioides, Anal. Pl. IX. fig. 1.
Chickrassia tabularis ... ... xi.
Chionanthus intermedia ... ... ccxxxix.
,, Malabarica ... ... ccxxxix.
Chloroxylon swietenia ... ... xi.
Chrysophyllum Roxburghii ... ... ccxxxvi.
Cinnamomum zeylanicum cclxiii
Citrus sp., Anal. Pl. VII. fig. 6
Clausena Willdenovii, Anal. Pl. VII. fig. 3.
Cleidion Javanicum ... ... cclxxii.
Cleistanthus pallidus, Anal. Pl. XXIV. fig. 4.
,, patulus, Anal. Pl. XXIV. fig. 4.
Clerodendron infortunatum, Anal. Pl. XXII. fig. 1.
Cleyera gymnanthera ... ... xci.
Cleyera tusiopetala, Anal. Pl. III. fig. 3.
Cluytia collina. See Lebidieropsis.
Cocculus cordifolius, Anal. Pl. II. fig. 1.
Cochlospermum gossypium ... ... clxxi.
Codiæum umbellatum, Anal. Pl. XXIII. fig. 6.
Coffea Arabica, Anal. Pl. XVIII. fig. 1.
Colubrina Asiatica, Anal. Pl. X. fig. 5.
Connarus pinnatus, Anal. Pl. XI. fig. 5.
Conocarpus acuminatus ... ... xvi.
Conocarpus latifolius ... ... xv.
Conocephalus niveus. See Morocarpus.
Cordia myxa ... ... cclxlv.
,, Wallichii ... ... ccxlv.
Cordylanthus. See Homalium
Cotoneaster buxifolia, Anal. Pl. XIII. fig. 3.
Cratæva religiosa ... ... cxvi.
Croton aromaticum ... ... cclxxxiii.
,, scabiosum ... ... cclxxxiii.
Crudia zeylanica ... ... cxc.
Crytocarya Wightiana ... ... ccxcix.
Cudranus Rumphii, Anal. Pl. XXVII. fig. 1.
Cullenia excelsa, Anal. Pl. IV. fig. 3.
Cupania canescens ... ... cli.
Cyathocalyx Zeylanicus, Anal. Pl. I. fig. 6.
Cyclostemon macrophyllus ... ... cclxxviii.
Cylicodaphne. See Tetranthera.
Cyminosma pedunculata, Anal. Pl. VI. fig. 4.
Cynometra cauliflora ... ... cccxv.
,, ramiflora ... ... cccxv.
,, Travancorica ... ... cccxvi.

D.

Dalbergia latifolia ... ... xxiv.
Dalbergia Mooniana ... ... clxxxvii.
Dalbergia sissoo ... ... xxv.
Daphniphyllum glaucescens ... ... cclxxxviii.
Daphniphyllum Roxburghii ... ... cclxxxviii.
Dasyaulus. See Bassia.
Debregreasia velutina. See Morocarpus.
Dendrocalamus strictus ... ... cccxxv.
Desmodium sephalotes, Anal. Pl. XII. fig. 4.
Desmostemon. See Ostodes.
Dialium ovoideum ... ... clxxxi.
Dicellostyles axillaris, Anal. Pl. III. fig. 6.

				Tab.
Dichilanthe Zeylanica, Anal Pl. XV. fig. 4				
Dichopsis. See Bassia.				
Dichrostachys cinerea	...	...	...	clxxxv
Dillenia pentagyna	...	...	...	civ.
„ speciosa	...	...	...	ciii.
Dimocarpus longana	...	...	..	clvi.
Dimorphocalyx. See Trigonostemon.				
Diospyros *calycina*	...	...	...	lxviii.
„ ebenum	...	...	...	lxv.
„ embryopteris	...	...	...	lix.
„ *exsculpta*	...	...	...	lxvi.
„ foliolosa	...	...	...	lxviii.
„ melanoxylon	...	...	...	lxvii.
„ Tupru	...	...	...	lxvi.
„ *Wightiana*	...	...	...	lxvii.
Diplospora apiocarpa	...	...	...	cccxxiii.
Dipterocarpus Indicus	...	...	...	xciv.
Discospermum apiocarpum,	..	...	...	ccxxiii.
Dodonæa Burmannniana, Anal. Pl. XI. fig. 2.				
Dodonæa viscosa, Anal. Pl. XI. fig. 2.				
Doona Gardneri	...	...	...	xcviii.
„ Zeylanica	...	...	...	xcvii,
Drymispermum. See Phaloria.				
Dysodidendron. See Saprosma.				
Dysoxylon macrocarpum	...	...	...	cl.

E.

Eccremanthus. See Pometia.				
Ehretia lævis	..	...	...	ccxlvi
Ekebergia. See Mallea.				
Elæagnus latifolia, Anal. Pl. XXV. fig. 1.				
Elæocarpus amœnus	...	...	...	cxi.
„ ferrugineus	...	...	...	cxii.
„ tuberculatus	...	...	...	cxiii.
„ venustus	...	..	...	clxxiv.
Elæodendron Roxburghii	...	...	...	cxlviii.
Ellipanthus unifoliatus	...	...	...	clxx.
Embelia robusta, Anal. Pl. XIX. fig. 2.				
Emblica officinalis	...	...	...	cclviii.
Embryopteris glutinosa	...	...	..	lxix.
Epicarpurus. See Streblus and Taxotrophis.				
Epithinia. See Scyphiphora.				
Erinocarpus Nimmonii	...	...	...	cx.
Eriodendron anfractuosum, Anal. Pl. IV. fig. 2.				
Eriolæna Hookeriana, Anal. Pl. V. fig. 2.				
Eriolæna quinquelocularis, Anal. Pl. V. fig. 2.				
Erythrina Indica	...	...	...	clxxv.
„ stricta	...	...	...	clxxv.
Erythrospermum phytolaccoides, Anal. Pl. II. fig. 6.				
Erythroxylon Indicum	...	...	...	lxxxi.
Eugenia alternifolia	...	...	...	cxcviii.
„ cylindrica	...	...	...	cci.
„ floccosa	...	...	...	cc.
„ hemisphærica	...	...	...	cciii.
„ jambolana	...	...	...	cxcvii.
„ Malabarica	...	...	...	cxcix.
„ Zeylanica	...	...	...	ccii.
Euonymus crenulatus	...	...	...	cxliv.

Tab.

Euphorbia antiquorum, Anal. Pl. XXII. fig. 4.
Euphorbia Longana ... ... clvi.
Eupyrena glabra, Anal. Pl. XVI. fig. 4.
Eurya japonica ... ... xcii.
Eurya Wightiana ... . xcii.
Evodia triphylla, Anal. Pl. VI. fig. 2.
Excœcaria Cochinchinensis, Anal. Pl. XXII. fig. 5.
,, insignis, Anal. Pl. XXII. fig. 5.

F.

Fagara triphylla, Anal. Pl. VI. fig. 2.
Fagræa Coromandelina ccxliv
Falconeria. See Excœcaria.
Feronia Elephantum ... ... cxxi.
Ficus religiosa ... ... cccxiv.
,, Tsiala ... ... cccxiv.
Filicium decipiens ... ... cxxix.
Flacourtia inermis, Anal. Pl. II. fig. 4.
,, sapida, Anal. Pl. II. fig. 4.
,, sepiaria, Anal. Pl. XXIV. fig 4 ♀ only.
Flueggia. See Securinega.

G.

Gærtnera Kœnigii, Anal. Pl, XXI. fig. 3.
Garcinia Cambogia ... ... lxxxv.
,, Morella ... ... lxxxvi.
Garcinia papilla ... ... lxxxv.
Garcinia pictoria ... ... lxxxvii.
,, Travancorica ... ... clxxiii.
Gardenia lucida, Anal. Pl. XV. fig. 6.
Gardenia turgida, Anal. Pl. XV. fig. 6.
Garuga pinnata ... ... cviii.
Gelonium lanceolatum, Anal. Pl. XXII. fig 6.
Gironniera reticulata ... ... cccxiii.
,, subæqualis ... ... cccxiii.
Givotia rottleriformis ... ... cclxxxv.
Glenniea Zeylanica ... ... cliii.
Glochidion Neilgherriense ... ... cclxxvii.
Gluta Travancorica ... ... lx.
Glycosmis pentaphylla, Anal. Pl. VI. fig. 6.
Glyptopetalum Zeylanicum, Anal. Pl. IX. fig. 5.
Glycicarpus. See Nothopegia.
Gmelina arborea ... ... ccliii.
Gnidia eriocephalus, Anal. Pl. XXV. fig. 2.
Gomphandra coriacea, Anal. Pl. XI. fig. 4.
Gomphia angustifolia, Anal. Pl. VIII. fig. 4.
Goniothalamus Wightii, Anal. Pl. I. fig. 3.
Gordonia obtusa ... ... lxxxiii.
Gordonia parvifolia. ... ... lxxxiii.
Goughia. See Daphniphyllum.
Grewia tiliæfolia ... ... cviii.
Griffithia. See Randia.
Grislea tomentosa, Anal. Pl. XIV. fig. 4.
Grumilea. See Psychotria.
Gualtheria fragrantissima, Anal. Pl. XIX fig. 1.
Gualtheria Leschenaultii, Anal. Pl. XIX. fig. 1.

Tab.

Guatteria. See Polyalthia.
Guazuma tomentosa ... ... cvii.
Guettarda speciosa, Anal. Pl. XVII. fig. 2.
Gyrinops Walla ... ... ccciii.
Gyrocarpus Jacquini ... ... cxcvi.

H.

Haasia Wightii ... ... ccxcviii.
Hamiltonia suaveolens, Anal. Pl. XVII. fig. 3.
Hardwickia binata ... ... xxvi.
„ pinnata ... ... cclv.
Harpullia imbricata ... ... clviii.
Hebradendron Cambogioides ... ... lxxxvi.
Hedera acuminata ... ... ccxiii.
Hedera racemosa ... ... ccxiv.
Helicia robusta ... ... ccci.
Helictores Isora, Anal. Pl. V. fig. 1.
Helminthospermum. See Gironniera.
Hemicyclia elata ... ... cclxxix.
Hemigyrosa canescens ... ... cli.
„ deficiens ... ... ccxxxi.
Heptapleurum racemosum ... ... ccxiv.
Heritiera littoralis, Anal. Pl. XI. fig. 6.
„ Papilio .. .. ccxviii.
Hernandia peltata ... ... ccc.
Heynea affinis ... ... cxxxiv.
Heynea trijuga ... ... cxxxiv.
Hibiscus tiliaceus, Anal. Pl. IV. fig. 1.
Hippocratea Arnottiana, Anal. Pl. X. fig. 3.
Hæmatospermum. See Homonoya.
Holarrhena antidysenterica, Anal. Pl. XX. fig. 6.
Holigarna longifolia .. .. clxvii.
Holoptelæa. See Ulmus.
Homalium Ceylanicum ... ... ccx.
„ Travancoricum ... ... ccxi.
Homonoya riparia, Anal. Pl. XXIV. fig. 1.
Hopea parviflora ... ... vii.
„ Wightiana ... ... xcvi.
Horsfieldia. See Myristica.
Hortonia floribunda, Anal. Pl. XXV. fig. 3.
Humboldtia unijuga ... ... clxxxiii.
Hunteria Zeylanica ... ... cclxv.
Hydnocarpus alpina ... ... lxxvii.
Hymenodyction obovatum ... ... ccxix.
„ utile ... ... ccxix.
Hyptianthera macrocarpa ... ... cccxxviii.

I.

Ilex denticulata ... ... cxlii.
„ Malabarica ... ... cxliii.
„ Wightiana ... ... cxlii.
Indigofera pulchella, Anal. Pl. XII. fig. 1.
Inga xylocarpa ... ... clxxxvi.
Isonandra acuminata ... ... xliii.
Ixora parviflora ... ... ccxxii.

J.

			Tab.
Jambosa cylindrica	...	...	... cci.
Jonesia Asoca	...	...	... lvii.
Julostyles angustifolia, Anal. Pl. III. fig. 4.			

K.

Kandolia Rheedii, Anal. Pl. XIII. fig. 6.			
Kayea stylosa	...	...	... cii.
Kleinhovia hospita, Anal. Pl. IV. fig. 4.			
Knema. See Myristica.			
Kokoona Zeylanica	...	...	... cxlvi.
Kydia axillaris, Anal. Pl. III. fig. 6.			
Kydia calycina, Anal. Pl. III. fig. 5.			
Kydia fraterna, Anal. Pl. III. fig. 5.			
Kurrima Ceylanica	...	...	... cxlvii.
„ Indica	...	...	... cxx.

L.

Lagerstrœmia lanceolata	...	...	... xxxii.
„ microcarpa	...	...	... xxx.
„ parviflora	...	...	... xxxi.
„ Reginæ	...	...	... xxix.
Lansium Anamullayanum	...	...	... cxxxi.
Lapoitea crenulata	...	...	... cccvi.
Lasianthera apicaulis	...	...	... cxxxix.
Lasianthus venulosus, Anal. Pl. XVII. fig. 5.			
Lasiosiphon eriocephalus, Anal. Pl. XXV. fig. 2.			
Lawsonia alba, Anal. Pl. XIV. fig. 6			
Lebidieropsis orbicularis, Anal. Pl. XXIV. fig. 5.			
Lepidadenia. See Tetranthera.			
Leptonychia moaccuroides	...	...	... cxiv.
Lepurandra. See Antiaris			
Ligustrum Perottotti, Anal. Pl. XIX. fig. 5.			
Limonia alata, Anal. Pl. VII. fig. 4.			
Litsæa Zeylanica	...	...	... ccxciv.
Lonicera ligustrina, Anal. Pl. XV. fig. 5.			
Lophopetalum Wightianum	...	...	... cxlv.
Lumnitzera racemosa, Anal. Pl. XXI. fig. 2.			

M.

Maba buxifolia, Anal. Pl. XIX. fig. 4.			
„ oblongifolia, Anal. Pl. XXI. fig. 1.			
Macaranga Indica	...	...	... cclxxxvii.
„ tomentosa	...	...	... cclxxxvii.
Machilus macrantha	...	...	... cclxiv.
Maclellandia Griffithiana, Anal. Pl. XIV. fig. 5.			
Maclura. See Cudranus.			
Macreightia oblongifolia, Anal. Pl. XXI. fig. 1.			
Mœsa Indica, Anal. Pl. XVIII. fig. 4.			
Mahonia. See Berberis.			
Mallea Rothii, Anal. Pl. VIII. fig. 5.			
Mallotus Philippinensis	...	...	... cclxxxix.
Mammea. See Ochrocarpus.			
Mangifera Indica	...	...	... clxii.
Mappia fœtida	...	...	... cxli.

				Tab
Mistixia arborea			..	ccxvi.
Melanthesa See Breynia.				
Melia Azadirachta			...	xiii
„ Azedarach	...	...		xiv
„ composita	...	..	.	xii
Melicope Indica, Anal Pl VI fig 1.				
Meliosma Arnottiana	...	...	.	clx
„ pungens	..	...		clx
Melochia velutina, Anal Pl V fig 3				
Memecylon capitellatum	.	..	..	ccvi
„ umbellatum	...	...	.	ccvi.
Mephitidea See Lasianthus				
Mesua Coromandelina	...	..	..	lxiv
Michelia Nilagirica	...	..	..	lxii.
Microclæna quinquelocularis, Anal Pl V fig 2.				
Microelus See Bischoffia.				
Micromelum pubescens, Anal Pl VII fig 1.				
Microtropis ramiflora, Anal Pl. IX. fig 6.				
Millusa velutina	...	...	...	xxxvii
Millingtonia Arnottiana	...	...	...	cxl
Millingtonia hortensis	..	...	..	ccxlix.
Millingtonia pungens	...	..	...	clx.
Milnea See Aglaia.				
Mimusops elengi	...	...	...	xl.
Mischodon Zeylanicus	...	...	...	ccxc.
Mitrephora grandiflora	..	..	...	lxxv.
Moacurra gelonioides, Anal Pl IX fig 1.				
Monocera ferruginea	...	...	...	cxii.
Monocera tuberculata	...	...	...	cxiii.
Monoporandra cordifolia	...	...	.	ci
Monosis See Vernonia.				
Morinda citrifolia	...	...	...	ccxx
Moringa pterygosperma		...	...	lxxx.
Morocarpus longifolius, Anal Pl XXVI fig 5				
Mundulea suberosa, Anal Pl XII fig 2.				
Murraya exotica, Anal Pl VII. fig 2				
Mussœnda frondosa, Anal Pl XVI fig 3				
Myristica corticosa	...	..	...	cclxii
„ Farquhariana	...	...	...	cclxx.
„ laurifolia	...	...	...	cclxvii
„ Malabarica	...	.	..	cclxix.
„ magnifica	...	..	..	cclxviii.
Myrsine capitellata	..	...	...	ccxxxiv

N.

Nargedia macrocarpa	..	...	..	cccxxviii.
Nauclea Cadamba See Anthocephalus				
Nauclea coadunata	..	...	.	cccxviii.
Nauclea cordifolia See Adina.				
Nauclea elliptica, Anal Pl XXIX. fig 3				
Nauclea parvifolia See Stephegyne				
Nelitris jambosella, Anal Pl. XVI. fig 4				
Nemedra See Aglaia				
Nephelium longana	...	...	...	clvi.
Nephelium stipulaceum	...	...	.	clv.
Nœriya See Elæodendron				
Nimmonia See Amoora.				
Nothopegia Colebrookiana	...	...	...	clxiv.
Nyctanthes arbor-tristis	...	..	...	ccxl.

O.

Ochna squarosa, Anal. Pl. VIII. fig. 3
Ochrocarpus longifolius lxxxix
Octotropis Travancorica ccccxxvii
Odina Wodier cxxiii
Olax Wightiana, Anal. Pl. IX. fig. 2.
Olea glandulifera ccccxxviii
Opilia amentacea, Anal. Pl. IX. fig 3.
Ophioxylon densiflorum, Anal. Pl. XX. fig. 2.
Ophioxylon Neilgherriense, Anal. Pl. XX. fig. 2.
Oreocnide sylvatica, Anal. Pl. XXVI fig 4.
Ormosia Travancorica ... ... xlv.
Ornitrophe. See Schmidelia.
Orophea erythrocarpa, Anal. Pl. I. fig. 8.
Osmelia Gardneri ... ... ccix.
Ostodes Zeylanica ... ... cclxxiv.
Osyris arborea, Anal Pl. XXVI. fig 6-A.
Otonychium See Harpullia.
Ougeinia dalbergioides ... ... xxxvi.
Oxytenanthera Thwaitesii ... ... cccxxii.

P.

Pajanelia Rheedii, Anal. Pl. XXI. fig. 5.
Palenga See Putranjiva
Parkinsonia aculeata, Anal. Pl. XIII. fig. 2.
Parinarium Indicum ... ... cxci.
Pavetta involucrata, Anal Pl. XXIX fig 6
Pemphis acidula, Anal Pl. XIV. fig 5.
Pentapanax Leschenaultii, Anal. Pl. XV. fig. 3.
Pericopsis Mooniana ... ... clxxxvii.
Phœanthus Malabaricus, Anal. Pl. I. fig. 7.
Phœbe Wightii ... ... cxcii.
Phaleria cauliflora, Anal. Pl. XXV. fig. 5
Phoberos. See Scolopia.
Photinia Notoniana ... ... cxcii.
Phyllanthus emblica. .. .. cclviii.
,, Indicus, Anal. Pl. XXIV. fig. 6.
Pieraridia. See Baccaurea
Pithecolobium Anamallayanum ... ... clxxxix.
,, dulce ... .. clxxxviii.
Pisonia aculeata, Anal. Pl. XXII fig 3
Pittosporum tetraspermum, Anal. Pl. II. fig 8
Pityranthe verrucosa ... . cix.
Platea. See Gomphandra.
Plectronia didyma ... ... ccxxi.
Plecospermum spinosum, Anal. Pl XXVI fig. 2.
Pleurostylia Wightii, Anal. Pl. X. fig. 1
Podadenia Thwaitesii ... ... cclxxxii.
Podocarpus latifolia .. . cclvii.
Pœciloneuron Indicum ... ... iii.
Pœciloneuron pauciflorum ... ... xciii.
Poinciana elata ... ... cclxxviii.
Polyalthia cerasoides ... . i.
,, coffeoides ... ... lxxiii.
,, fragrans ... . lxxiv.
,, longifolia ... ... xxxviii.
Polyodontia. See Pygeum.
Polyscias acuminata ... ... ccxiii.

			Tab.
Pometia eximea	...	...	clvii.
Pongamia glabra	..	...	clxxvii.
Popowia Beddomeana, Anal. Pl. I. fig. 2.			
Popowia ramosissima, Anal. Pl. I. fig. 2.			
Premna tomentosa	.	...	. ccli.
Prismatomeris albidiflora, Anal. Pl. XXIX. fig 4.			
Prosopis spicigera	..	...	... lvi.
Prosorus Indica, Anal Pl. XXIV. fig. 6.			
Protium caudatum	...	...	... cxxv.
Protium Gileadense	...	...	... cxxvi
Psychotria elongata, Anal Pl. XVII. fig. 6.			
Pteridophyllum. See Filicium.			
Pterocarpus Indicus	...	...	... xxiii.
„ marsupium	...	...	. xxi.
„ santalinus	...	...	... xxii.
Pterospermum rubiginosum	...	...	... cvi.
Putranjiva Roxburghii	...	...	... cclxxv.
„ Zeylanica	...	...	... cclxxv.
Pygeum acuminatum	...	..	.. lix.
Pygeum Ceylanicum	...	...	.. lix.
Pyrrhosia. See Myristica.			
Pyrularia Wallichiana	..	...	... ccciv.

R.

Randia dumetorum, Anal. Pl. XVI. fig. 1.			
„ uliginosa, Anal. Pl. XVI. fig. 1.			
Ramnus hirsutus, Anal Pl. X. fig. 6.			
Rhizophora Candelaria, Anal. Pl. XIII. fig. 4.			
Rhizophora mucronata, Anal. Pl. XIII. fig. 4.			
Rhododendron arboreum	...	...	... ccxxviii.
Rhodomyrtus tomentosus, Anal. Pl. XIV. fig. 3.			
Rhus decipiens	...	..	... cxix.
Rhus Mysorensis, Anal. Pl. XI. fig. 3.			
Robinia suberosa, Anal. Pl. XII. fig. 2.			
Rottlera Thwaitesii. See Podadenis.			
Rottlera tinctoria. See Mallotus.			
Rottlera urandra. See Cleidion.			
Roumea hebecarpa, Anal. Pl. II. fig. 5.			
Rourea santaloides, Anal. Pl. XI. fig. 4.			

S.

Saccopetalum tomentosum	...	...	... xxxix.
Sageræa Dalzellii, Anal Pl. I. fig. 4.			
Salacia oblonga, Anal. Pl. X. fig. 4.			
Salix tetrasperma	...	...	... cccii.
Salmalia Malabarica	...	...	... lxxxii.
Salvadora Wightiana	...	...	... ccxlvii.
Samadera Indica, Anal. Pl. VIII. fig. 1.			
Sandoricum Indicum	...	...	... cccxix.
Santalum album	...	...	... cclvi.
Sapindus emarginatus	..	...	... cliv.
Sapindus unijugus	...	...	... clii.
Sapota elengioides	...	...	... ccxxxv.
Saprosma Wightii, Anal. Pl. XVII. fig. 4.			
Saraca Indica	...	...	... lvii.
Sarcocephalus cordatus	...	...	... cccxviii.
Sarcococca saligna, Anal. Pl. XXIV. fig. 5			

Sarcococca trinervia, Anal. Pl. XXIV. fig. 5.
Sarcochinum longifolium, Anal. Pl. XXIV. fig. 1.
Sarosanthera lasiopetala, Anal. Pl. III. fig. 3.
Sepa Lindleyana. See Aporosa.
Schleichera trijuga ... ...
Schimidelia hispida ... ...
Schrebera swietenioides c
Sclerostylis. See Atalantia
Scolopia crenata lx
Scutia Indica, Anal. Pl. XI. fig. 1.
Scyphiphora Malayana, Anal. Pl. XXIX. fig. 5.
Scyphostachys cofteoides, Anal. Pl. XVI. fig. 6.
Scytalie longaya ... ... clvi.
Securinega leucopyrus, Anal. Pl. XXIV. fig 4 ♂ only.
Semecarpus Anacardium ... ... clxvi.
,, Travancorica ccxxxii
Serissa. See Saprosma.
Sesbania Ægyptiaca, Anal. Pl. XII. fig. 3.
Sethia Indica ... ... lxxx.
Shorea laccifera ... ... vi.
,, robusta ... ... iv.
,, Tambagaia ... ... v.
Solenocarpus Indica ... ... ccxxxiii.
Sonneratia acida, Anal. Pl. XV. fig. 1.
Sophora interrupta, Anal. Pl. XII. fig. 6.
Soymida febrifuga ... ... viii.
Spathiostemon. See Homonoya.
Spathodea falcata ... ... lxxi.
Sphærocarya leprosa ... ... cxxxvii.
Sphragidia. See Cyclostemon.
Spondias mangifera ... ... clxix.
Sponia Wightii ... ... cccxi.
Stalagmites. See Xanthochymus.
Stemonoporus acuminatus ... ... c.
,, Gardneri ... ... xcix.
Stemonurus fœtidus ... ... cxli.
Stephegyne parvifolia ... ... xxxiv. and Anal. Pl. XXIX. fig 1.
Sterculia guttata ... ... cv.
Sterculia Haynii ... ... ccxxx.
Stereospermum chelonoides ... ... lxxii.
Streblus aspera, Anal. Pl. XXVI. fig. 1.
Streptostigma. See Harpullia.
Strombosia Ceylanica ... ... cxxxvii.
Strongylocalyx hemisphærica ... ... cciii.
Strychnos nux-vomica ... ... ccxliii.
Stylocoryne Webera, Anal. Pl. XVI. fig. 2.
Stylodiscus. See Bischoffia.
Symplocos Gardneriana ... ... ccxxxvii.
,, oligandra, Anal. Pl. XX. fig. 1.
Syzygium alternifolium ... ... cxcviii.
Syzygium jambolanum ... ... cxcvii.

T.

Tabernamontana verticellata, Anal. Pl. XX. fig. 3.
Tamarindus Indica ... ... clxxxiv.
Tamarix ericoides, Anal. Pl. III. fig. 1.
Taxotrophis Roxburghii, Anal. Pl. XXVI. fig. 3.
,, Zeylanica, Anal. Pl. XXVI. fig. 3.

				Tab.
Tectona grandis	...	...	...	cc!.
Teinostachyum Wightii	...	...	...	cccxxiii.
Tephrosia suberosa, Anal. Pl. XII. fig. 2.				
Terminalia Arjuna	...	..	...	xxviii.
„ belerica	...	...	...	xix.
„ Catappa	...	...	...	xx.
„ chebula	...	...	...	xxvii.
Terminalia coriacea	...	...	...	xvii.
Terminalia glabra	...	...	...	xvii.
Terminalia paniculata	...	...	...	xviii.
„ tomentosa	...	...	...	xvii.
Ternatrœmia gymnanthera	...	...	...	xci.
Tetracrypta. See Anisophyllea.				
Tetraglossa. See Cleidion.				
Tetrameles Grahamiana	...	...	...	ccxii.
Tetrameles nudiflora	...	...	...	ccxii.
Tetranthera Wightiana	...	...	...	ccxciii.
Thespesia populnea	...	...	...	lxiii.
Timonius Jambosella, Anal. Pl. XVI. fig. 4.				
Toddalia aculeata, Anal. Pl. VI. fig. 5.				
Trewia nudiflora	...	...	...	cclxxxi.
Trichadenia Zeylanica, Anal. Pl. II. fig. 7.				
Trichaurus. See Tamarix.				
Trigonostemon Lawianus	...	...	...	cclxxiii.
Trochisandra Indica	...	...	...	cxx.
Trophis aspera. See Streblus.				
Trophis spinosa. See Cudranus and Taxotrophis.				
Turpinia Nepalensis	...	...	...	clix.

U.

Unona Lawii, Anal. Pl. I. fig. 1.				
Ulmus integrifolia	..	...	...	cccx.
Urandra. See Lasianthera.				
Urophyllum Zeylanicum, Anal. Pl. XVI. fig. 5.				
Urostigma. See Ficus.				
Urtica crenulata. See Laportea.				

V.

Vaccinium Leschenaultii	...	...	...	ccxxvii.
Vateria Indica	...	...	...	lxxxiv.
„ Malabarica	...	...	...	lxxxiv.
Vatica laccifera	...	...	...	vi.
Vatica Roxburghiana	...	...	...	xcv.
Vatica Tambagaia	...	...	...	v.
Vernonia volkamericæfolia	...	...	...	ccxxv.
„ Wightiana	...	...	...	ccxxvi.
Viburnum acuminatum	...	...	...	ccxvii.
Viburnum punctatum	...	...	...	ccxvii.
Villebrunea sylvatica. See Oreocnide.				
Virgilia aurea, Anal. Pl. XII. fig. 5.				
Visenia umbellata, Anal. Pl. V. fig. 3.				
Vitex altissima	...	...	...	ccliii.

W.

Walsura piscidia, Anal. Pl. VIII. fig. 6.				
Webera Asiatica, Anal. Pl. XVI. fig. 2.				
Weihea Zeylanica	...	...	...	cxciv.
Wendlandia Notoniana	...	...	..	ccxxiv.

Tab.

Wikstrœmia virgata, Anal. Pl. XXV. fig. 4
Willughbeia Ceylanica, Anal. Pl. XX. fig. 4.
Wormia bracteata cxv
Woodfordia tomentosa, Anal. Pl. XIV. fig. 4.
Wrightia tinctoria ... ... ccxli.

X.

Xanthochymus pictorius ... ... lxxxviii.
Xanthophyllum angustifolium, Anal. Pl III. fig. 2.
,, Arnottianum, Anal. Pl. III. fig. 2
,, virens, Anal. Pl. III. fig 2.
Xanthoxylum ovalifolium, Anal. Pl. VI. fig 3.
,, Rhetsa, Anal. Pl. VI. fig. 3
Xanthoxylum triphyllum, Anal Pl. VI. fig 2.
Xylia dolabriformis ... ... clxxxvi.
Xylocarpus granatum ... ... cxxxvi.
Xylopia Championii, Anal. Pl. I. fig. 5.
,, parviflora ... ... clxxii.

Z

Zizyphus jujuba cxlix

INDEX

TO THE GENERA DESCRIBED IN THE MANUAL.

The Italics are synonyms.

A.

	Page.
Abelia	123
Aberia	16
Abroma	36
Acacia	94
Acalypha	189
Acer	71
Achras	142
Acmene	106
Acranthera	125
Acrocarpus	91
Acronychia	42
Actephila	189
Actinodaphne	186
Adansonia	29
Adelia	212
Adenanthera	94
Adenochlæna	206
Adenogynum. See Cephalocroton.	
Adenosacme	125
Adina	127
Adinandra	24
Adisca. See Mallotus.	
Adisca. See Macaranga.	
Ægiceras	139
Ægle	47
Æsculus	71
Æschynomene	86
Aganosma	155
Agapetes. See Vaccineum.	
Agati	86
Aglaia	55 and see Addenda.
Agrimonia	97
Agrostistachys	205
Agylophora	129
Agyneia	189
Ailanthus	49
Alangium	123
Albizzia	94
Alcanna	118
Alchemilla	97
Alchornea	189
Aleurites	205
Aleurodendron	35
Allamanda	155
Allaxanthus	221
Alleophania	125
Alphonsea	10
Alseodaphne	184
Alsodeia. See Plate 229	
Alstonia	160
Altheria	35
Alyxia	158
Amanoa	202
Ammania	116
Amoora	55
Amyris	52
Anacardiaceæ	77
Anacardium	78
Anacolosa	60
Anamorpha	35
Ancylocladus	156
Andersonia	55
Andromeda	136
Andrachne. See Bischoffia.	
Andromeda. See Vaccinium.	
Anictoclea. See Tetrameles.	
Anisophyllea	102
Anneslia. See Calliandra.	
Anodendron	155
Anomosanthes	72
Anomospermum	189
Anona	9
Anonaceæ	7
Anotis	125
Anstrutheria. See Weihea.	
Antiaris	221
Antidesma	200
Anthocephalus	127
Anthodon	67
Apocynaceæ	155
Apodytes	62
Apollonias	185
Aporosa	199
Aquilaria	178
Aralia	121
Araliaceæ	120
Araucaria	227
Ardisia	138
Areca	228
Arenga	228
Argostemma	125
Arouna. See Dialium.	
Artocarpus	219
Arundinaria	230
Asteriastigma	236 and see Plate 226
Astranthus. See Homalium.	
Astylis. See Hemicyclia	
Atalantia	46
Aubletia	118
Aucuba	123
Aureliana	121
Averrhoa	39
Avicennia	174
Axanthes	131
Axenfeldia. See Mallotus.	
Axinandra	119
Azadirachta. See Melia.	

B.

	Page.
Baconia	134—7
Baccaurea	198
Bœobotrys	137
Balanites	50
Balanocarpus. See Addenda.	
Balantium. See Parmarium.	
Baliospermum	189
Balonopteris	33
Balsamodendron	52
Bambusa	231
Bambusaceæ	228
Banksia	177
Barberina	149
Barringtonia	112
Bassia	140
Batschia. See Humboldtia.	
Bauhinia	92
Beaumontia	155
Beddomea	56
Beesha	234
Beilschmiedia	185
Benthokæ	156
Bentinckia	228
Berberidaceæ	12
Berberis	12
Bergera	44
Berrya	37
Bignonia	168
Bignoniaceæ	167
Biporeia	49
Bischoffia	198
Bixa	15
Bixineæ	14
Bluberopus	160
Blachia	213
Blackburnia	41
Blackwellia. See Homalium.	
Blekeria	158
Blepharistemma	101
Blighia	71
Bocagea. See Addenda.	
Boerhavia	175
Bohmeria	225
Bombax	30
Borassus	228
Boragineæ	165
Boswellia	52
Bouchea	171
Bouea	78
Boutonea. See Mallotus.	
Boymia	41
Brachytome	125
Brassaiopsis	121
Briedelia	201
Breynia	196
Broussonetia	89
Brugulera	100
Buchanania	79
Buddleia	163
Bugainvillea	175
Bursera	53
Burseraceæ	51
Bursinopetalum. See Mastixia.	
Butea	88
Byrsophyllum	134—2

C.

	Page.
Cadamba	134—4
Cæiocline	9
Cœlodepas	207
Cœlodiscus	206
Cæsalpinia	90
Cailliea. See Dicrostachys.	
Calamus	228
Calliandra. See Plate 317	
Callicarpa	173
Callitris	227
Calophyllum	21
Calosanthes	168
Calpurnia	89
Calycopteris	102
Calysaccion. See Ochrocarpus	
Camphor tree	184
Campnosperma	81
Canarium	52 & 148
Canajera	179
Canthium	134—5
Capparis	13
Capparidaceæ	13
Caprifoliaceæ	123
Caralha	101
Carapa	57
Cardiospermum	71
Careya	112 & 148
Carissa	157
Carlemannia	125
Carnia	24
Caryodaphne. See Cryptocarya.	
Caryophyllum	106
Caryota	228
Casearia	119
Cassia	91 & 181
Cassytha	184
Casuarina	226
Catenaria	86
Catinga	106
Cathartocarpus. See Cassia.	
Cathormion. See Pithecolobium.	
Cavallium	32
Cavalum	32
Ceanothus	69
Cedrela	57
Cedrus	227
Celastrineæ	63
Celastrus	66
Celtis	218
Cephaelis	125
Cephalanthus	125
Cephalocroton	206
Cerbera	157
Ceriops	99
Ceriscus	132
Chætocarpus	213
Chailletia	59
Chailletiaceæ	59
Chasalia	125
Chickrassia	57
Cheilosopsis	212
Chilocarpus	155
Chionanthus	154
Chiratia	118
Chloroxylon	57
Chomelea	133
Chonemorpha	155
Choripetalum	138
Chorizandra	189
Chrysophyllum	142
Cicca	189, 191
Cinchona	125
Cinchona. See Hymenodyction.	
Cinnamomum	184
Cipadessa	54
Ciponima	149
Citrus	47
Claoxylon. See Macaranga.	
Clausena	44
Cleghornia	155

	Page.
Cleidion	210
Cleistanthus	202
Cleistocalyx	106
Cleyera	24
Clerodendron	173
Clugtia	203
Cnesmone	189
Coccoceras	189
Cocculus	12
Cochlospermum	14, and see Plate 171
Cocos	228
Codarium. See Dicrostachys.	
Codiæum	213
Coffea	134—8
Colpoon	181
Colubrina	69
Combretaceæ	102
Combretum	102
Commia	214
Compositæ	135
Congea	171
Coniferæ	227
Connaraceæ	81
Connarus	82
Conocephalus	226
Cookia	44
Cordia	165
Cordilanthus. See Homalium.	
Corilla	224
Cornaceæ	123
Cornus	123
Coronilla	86
Corypha	228
Cotoneaster	97
Cratæva	13
Crescentia	168
Crinita	134—7
Croton	204
Crozophora	189
Crudia	93
Crypteronia	116
Cryptocarya	185
Cryptomeria	227
Cudrania	220
Cudranus	220
Cullenia	30
Cupia	132
Cupressus	227
Cyathocalyx	9
Cycas	227
Cyclostemon	199
Cylicodaphne. See Tetranthera.	
Cyminosma	42
Cynometra	94

D.

	Page.
Dalbergia	88
Dammacanthus	125
Dammara	227
Daphne	178
Daphniphyllum	217
Dasyaulus	140
Datisca	120
Datiscæ	120
Debregeasia	226
Decadia	149
Dendrocalamus	235
Dendrocnide. See Laportea.	
Dentella	125
Desmodium	86
Desmostemon. See Ostodes.	
Dialium	92
Dicellostyles	29
Dicerma	86
Dichapetalum	59
Dichelactina. See Phyllanthus.	
Dichilanthe	124 and 134—5
Dichopsis	110
Dicrobotryum	134—4
Dichrostachys	94
Didymocheton	54
Dillenia	6
Dilleniaceæ	6
Dimorphanthus	121
Dimorphocalyx. See Trigonostemon	212
Diospyros	143
Dipetalum	43
Diplesthes	67
Diplospora	134—3
Dipterocarpeæ	25
Dipterocarpus	25
Discospermum. See Diplospora.	
Discostigma	21
Dodonæa	74
Dondisia	134—5
Donkelaaria	134—4
Doona	27
Drimycarpus	78
Drymispermum	181
Dryptopetalum	101
Duabanga	116
Durio	30
Dysodidendron	134—11
Dysosmia	134—11
Dysoxylon	54

E.

	Page.
Ebenaceæ	142
Echinocroton. See Mallotus	
Edwardsia	89
Ehretia	166
Ekebergia	54
Elæagnaceæ	180
Elæocarpus	37 & tab. 174
Elæagnus	180
Elæodendron	67
Ellertonia	155
Ellipanthus	82
Embelia	137
Emblica. See Phyllanthus.	
Embryopteris. See Diospyros.	
Entosiphon. See Parinarium.	
Epicarpurus	221
Epithinia	134—3
Eriobotrya. See Photinea.	
Ericaceæ	135
Erinocarpus	37
Eriodendron	30
Eriolæna	35
Eriococcas	189
Erythrina	87
Erythrocarpus	214
Erythropsis	32
Erythrospermum	15
Erythroxylon	39
Eucalyptus	105
Eugenia	106
Eukleia	179
Euonymus	63
Eupatorium	135
Euphorbia	216
Euphorbiaceæ	187
Euphoria	74
Eupyrena	134—4
Eurya	24
Evodia	41
Excæcaria	214
Exitelia. See Parinarium.	

F.

	Page.
Fagara	41
Fagræa	164
Fatsia	121
Feronia	47
Feronia elephantum. See Plate 121.	
Fergusonia	125
Ferriola	148
Ficus	222
Filicium	53
Firmiana	32
Fissilia	60
Fistula. See Cassia.	
Flacourtia	15 & 214
Fluggea	197
Fragraia	97
Fusanus. See Santalum.	
Frenela	227

G.

Gœrtnera	164
Galedupa. See Pongamia.	
Galium	125
Garcinea. See Plate 173.	
Garcinia	20
Gardenia	134
Gardneria	163
Garuga	52
Gaurea	54
Gela	42
Gelonium	214
Gelpkia	106
Geophila	125
Geraniaceæ	39
Getonia. See Calycopteris	
Gironniera	219
Givotia	213
Glennica	73
Glochidion	191
Glossospermum	35
Gluta	79
Glycosmis	43
Glycicarpus	79
Glyptopetalum	64
Gmelina	172
Gnidia	179
Gordonia	24
Gomphandra	61
Gomphia	51
Gomocheton	54
Gomothalmus	8
Goughia. See Daphniphyllum.	
Gramineæ	228
Greggia	106
Grevillea	177
Grewia	37
Griffithia	132
Grislea	117
Grumilea	134—10
Grymania. See Patinarium	
Guazuma	37
Gualtheria	136
Guapurium	106
Guatteria. See Polyalthia.	
Guettarda	134—3
Guttiferæ	20
Gymnobothrys	214
Gymnospermeæ	227
Gymnosporia	66
Gynopachys	132
Gyrandra. See Daphniphyllum.	
Gyrinops	180
Gyrocarpus	103

H.

	Page.
Haasia	184
Habzelia	9
Hakea	177
Halesia	134—4
Hamiltonia	134—12
Hancea. See Mallotus.	
Hardwickia	94
Harpephyllum	79
Harpullia	74
Hartighsea	54
Hortonia	177
Hedera	121
Hedyotis	125
Helicia.	178
Helicteres	33
Heligme	155
Helminthospermum. See Gironniera.	
Helwingia	121
Hemicyclia	198
Hemigyrosa.	71 & see Plate 231
Henslowia	181
Heptapleurum	122
Heritiera	33 & 75 and see Plate 218
Hornandia	187
Hesperethusa	46
Heterophragma	169
Hexachlamys	106
Heynea	56
Heynichia	54
Hibiscus	29
Hildegardia	32
Hippocratea	67
Hippophae	180
Hæmatospermum	212
Halarrhena	160
Holigarna	81
Holochilus	147
Holoptelæa. See Ulmus.	
Homalium	120
Homonoya	211
Hopea	27 & 155 and Addenda.
Horsfieldia	176
Hugonia	39
Humboldtia	93
Hunteria	157
Hydnocarpus	16
Hydrophylax	125
Hymenocardia	189
Hymenodictyon	130
Hymenopogon	125
Hyptiapthera	125

I.

Icica	53
Ichnocarpus	155
Ilex	62
Ilicineæ	62
Indigofera	85
Inga	96
Irtia	235
Irya	176
Isonandra	141
Ixora	134—6

J.

Jackia	19 & 35
Jambolifera	42
Jambosa	106
Jasmineæ	152
Jatropha	189
Johnia	67